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Methods of Working the Coal Seams of Ohio

In the Hocking Valley Field an Overlying Stratum of Quicksand Makes it Impossible to Rob Pillars and Permit Surface to Cave In

BY FLOYD W. PARSONS

The coal territory embraced in the State of Ohio last year produced upward of 30,000,000 tons of coal, ranking fourth among the bituminous coal-producing States. Almost the entire output from Ohio is mined in what is known as the Hocking Valley field, situated in the southeastern part of the State. The coal seams throughout this region rarely outcrop to the surface, so that most of the mines are worked by shafts. The workings are not particularly gaseous or wet, and since the coal has only a dip of 30 ft. to the mile in a direction approximately south 70 deg. east, the problems encountered are not difficult.

The Eclipse Mine No. 3

The operation of the Johnson Coal Mining Company, at Hocking, Athens county, Fig. 1, is one of the most successful mines in this district. The coal is here produced from the Hocking No. 6, or middle Kittanning seam, which at this point averages about 6 ft. in thickness. The seam carries two slate bands, the larger of which varies from 2 to 3 in. thick, while the thinner parting seldom shows more than one-half inch thickness.

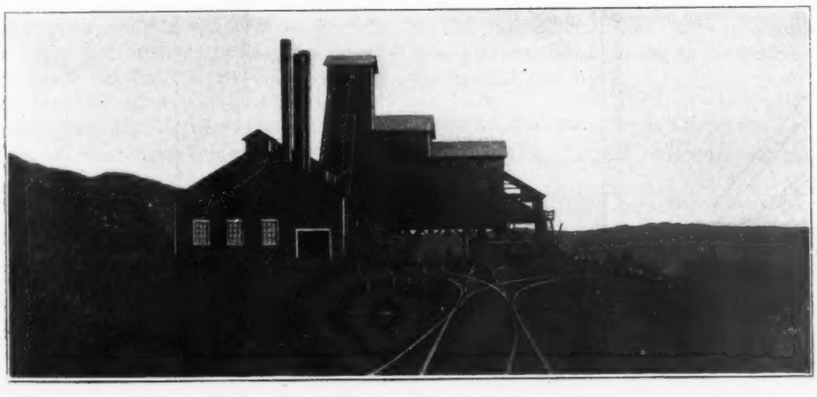


FIG. 1. ECLIPSE MINE NO. 3, HOCKING, OHIO

Method of Operation

The general system of development here carried on is shown in the accompanying map and follows closely the room and pillar system as usually worked. Three main parallel entries are driven from the bottom of the shaft to the boundary line; each entry is separated from the other by a 20-ft. pillar, while a 200-ft. pillar is preserved on each side. The cross entries which are driven to the face are 12 ft. wide and have a 20-ft. pillar separating them. The butt entries, from which the rooms are driven, are turned off the face entries at right angles; this method permits driving the rooms to the face of the coal, so that the seam is extracted with the least labor, and the product obtained in better sizes.

The butt entries are 500 ft. apart, while the face entries are turned off the main entry at 1500-ft. intervals. This allows 33 rooms on each butt entry and leaves a 100-ft. pillar between room No. 1 and the cross entry, and also a 100-ft. pillar between room 33 and the next face entry. Efforts are made to extract the maximum amount of coal on the advance, so that the rooms are driven 30 ft. wide, with a 10-ft. pillar between.

One important condition that must always be remembered at this and adjacent collieries, is the peculiar nature of the overlying strata. The bottom of the seam is fire-clay, while the roof is formed of a sulphur rock of considerable strength. Above this layer of sulphur rock is a seam of coal varying from one inch to four feet in thickness, then comes the real top flint, and above this, a considerable stratum of quicksand. Experience in this field has shown that when robbing takes place, this quicksand is most liable to come in and fill up the workings, causing great loss to the operators. Whether a method will be devised whereby the small pillars that are left can be robbed, remains for the future to determine.

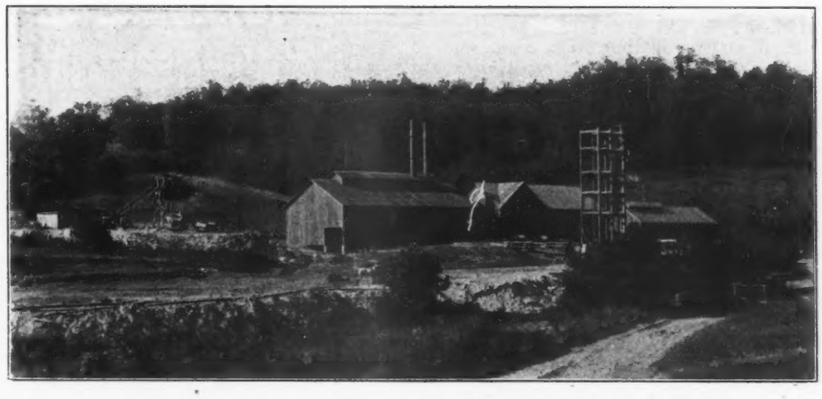
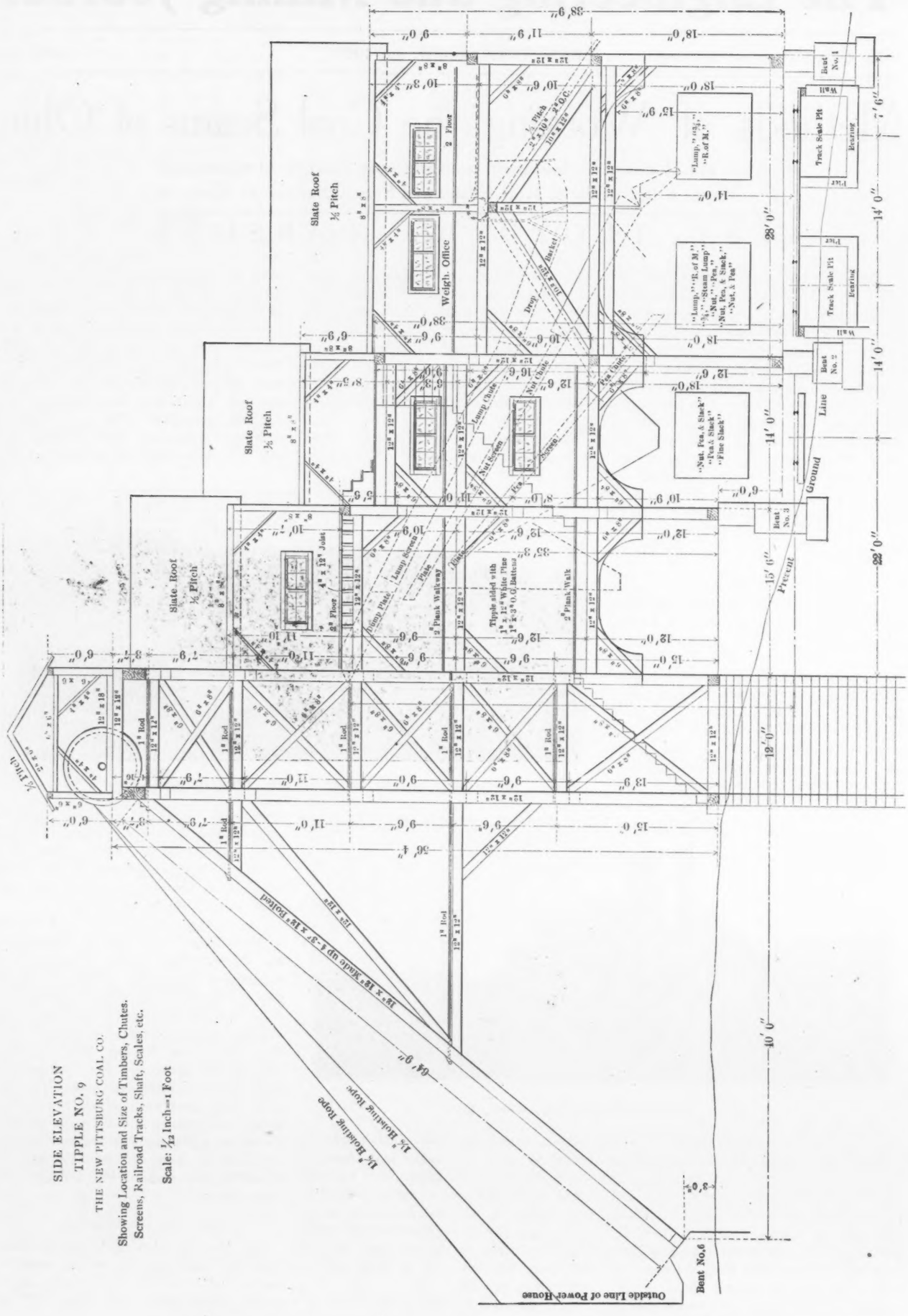


FIG. 2. SINKING THE SHAFT AT THE NEW PITTSBURG NO. 9 MINE

The haulage on the main road at this mine is accomplished by one Jeffrey 10-ton motor, which pulls 15 cars, each weighing 2 tons 5 cwt. The motor haulway is laid with 35-lb. steel, while the butt and face entries have 16-pound rails. Wooden rails are used in all rooms. For the purpose of driving the machines, lighting the mine, and for haulage, 250 volts are carried underground. The entries being practically level, the trolley system of haulage is used with success. Under no circumstances are the miners permitted to shoot on the solid, and all undercuts are made with Jeffrey 7-ft. chain cutters.

Hoisting and Pumping

For hoisting the coal, self-dumping cages are used, and the entire output is run over a 1¼-in. bar screen, being caught in a weigh-basket and paid for as



SIDE ELEVATION
TIPPLE NO. 9
THE NEW PITTSBURG COAL CO.
Showing Location and Size of Timbers, Chutes, Screens, Railroad Tracks, Shaft, Scales, etc.
Scale: 1/12 Inch=1 Foot

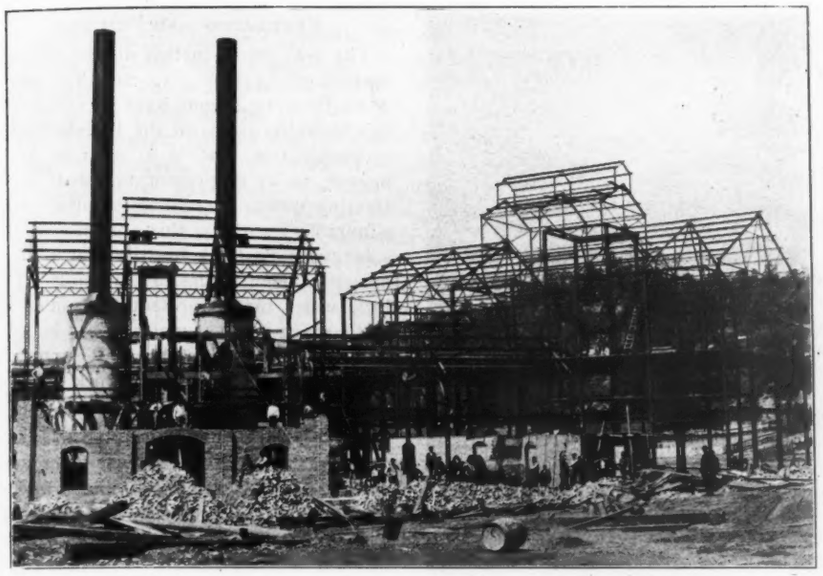


FIG. 5. THE FIRST STEEL-CONSTRUCTED COAL PLANT IN OHIO

screened lump. Since the framework supporting the screens is connected to the tipple structure, the entire building is subjected to considerable jarring when coal is being loaded.

For handling the water found in the mine, there has been installed one electric pump and two steam pumps. One of these latter pumps is used for hoisting, while the other is designed for gathering purposes. The gathering pump has a 5-in. main pipe along the entry and 2½-in. pipe in the rooms, while a 1½-in. pipe is run off from the room pipes when necessary.

The fan here installed is operated as a blower and was manufactured by the Buffalo Forge Company. The housing for the ventilator is entirely of steel so that the structure is absolutely fire-proof. At the present time, the fan is running 75 r.p.m. and sending about 47,000 cu.ft. of air into the mine per minute. The capacity of this fan is 100,000 cu.ft. per min., running at a speed of 150 revolutions per minute.

The shaft at this operation is 175 ft. deep and has three compartments. The approach to the shaft at the bottom is on a slight incline so that the cars will run to the cage by gravity. The track plan at the bottom is so arranged that all cars may be run on or off the cage from either side. Although the plan of development at this mine is of a higher standard than the system used at many of the mines in the district, there are one or two conditions which might be improved.

One point that deserves attention is permitting the intake airway near the foot of the down-cast to have a kink or corner in it, so that the air current is necessarily retarded and considerable friction produced, much to the detriment of the general system of ventilation. It is also true that the brattices in the mine were leaky, causing a large quantity of the air to short-circuit. These defects were evident to the management and have probably been rectified much to the betterment of the general operation.

New Pittsburg Coal Company

One of the largest operators in the Hocking coalfield is known as the New Pittsburg Coal Company whose mine, No. 9, which has been recently opened, is considered the ideal operation of the field. This operation, the plan of which is shown in the accompanying cut, is six miles from Nelsonville, and is governed by conditions similar to those already spoken of in connection with the Eclipse No. 3 mine.

At this operation, the shaker screen is dispensed with, and in its place, gravity screens have been installed. The point at which the cages dump is about 45 ft. above the railroad, so that the screens have a sufficient slope to carry the coal by gravity. Gravity screens of this sort have not been generally installed at the coal mines in this country. However, the success that has attended their use at a few operations is likely to make them more popular.

Method of Working

As is evident from the underground plan here shown, the system of development has been carefully laid out. Large circular pillars have been provided to protect the main shaft and the surface buildings adjacent. The stables have been carefully located so that the air that passes through them is immediately returned to the up-cast. For the purpose of development, the triple-entry system has been adopted, having the entries 12 ft. wide with a 42-ft. pillar separating them near the shaft, and a 30-ft. pillar between them at more distant points. On each side of these main entries, a 100-ft. barrier pillar is preserved, while all rooms are stopped before encroaching on the large pillar protecting the shaft.

Butt entries are driven every 500 ft. and have a 30-ft. pillar separating the butt entry and its air course. Face entries are turned off at intervals of 1400 ft. and are carefully protected on each side by 100-ft. pillars similar to those left to sustain the main entries. All entries and rooms are driven on centers, the latter being worked on the coal face and driven to meet. The

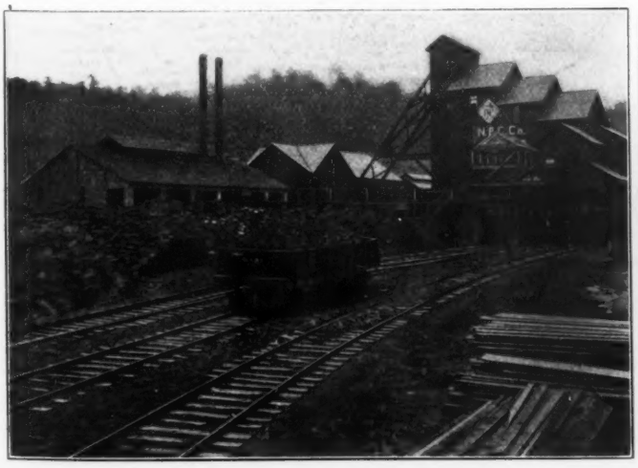


FIG. 4. TIPPLE AND POWER PLANT, NEW PITTSBURG NO. 9 MINE

FIG. 3. MINERS' HOUSES UNDER CONSTRUCTION

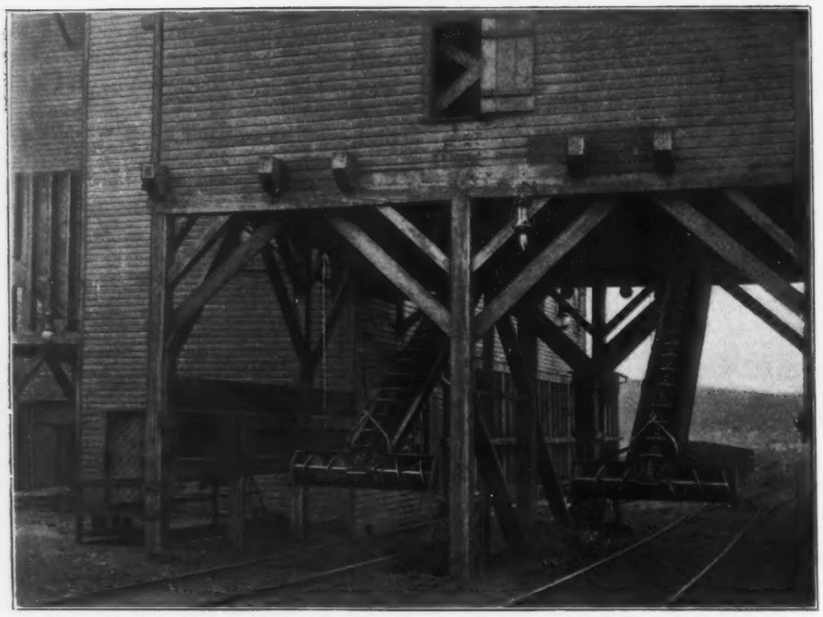


FIG. 6. ARRANGEMENT FOR UNLOADING AND ELEVATING SLACK COAL FROM RAILROAD CARS

map of the mine here shown is so complete and the system outlined so ideal, that a careful study of it may result in profit.

Mining and Haulage

The coal seam at this operation varies from 6 to 8 ft. in thickness, and has the two small bands of slate previously mentioned in the description of the Eclipse mine. It is intended to work the top coal, of which about 18 in. is found at this property. All rooms and entries are machine driven, the general type being the Morgan-Gardner chain-cutter machine driven by electricity. The haulage at present is accomplished by mules, although in a few months it is expected to use horses in pulling the coal from the rooms, and have electric motors haul the cars along the main entry. It is interesting to note that throughout this Ohio field the general practice is to use horses instead of mules. The reasons given are that horses are more tractable and can pull heavier loads. Since the mines throughout the district are comparatively dry and the roads well ballasted and kept in good shape, the horses are not so likely to be affected with greasy hoofs and other diseases that occur when muddy, ill kept roadways are found.

The motor tracks are supplied with 35-lb. steel, and the mule tracks with 16-lb. rails; the rails in all the rooms are of wood and will be removed and used as often as possible.

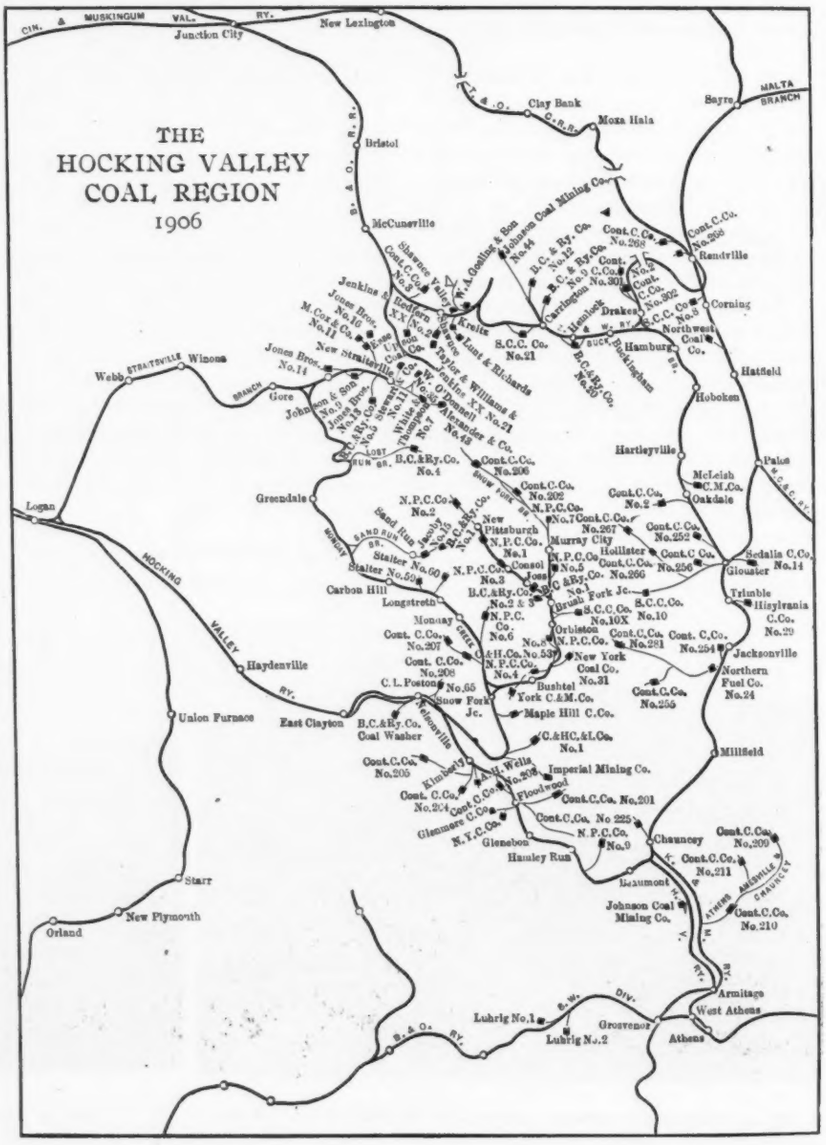
As is the custom at the Eclipse mine, the coal will be hoisted by self-dumping cages and run over the gravity screens. Everything under 1¼ in. and over ¾ in. is called nut coal; all that product from ¾ in. to ½ in. is called pea coal, while the finer material that passes through a ½-in. screen is considered as slack.

Ventilation and Pumping

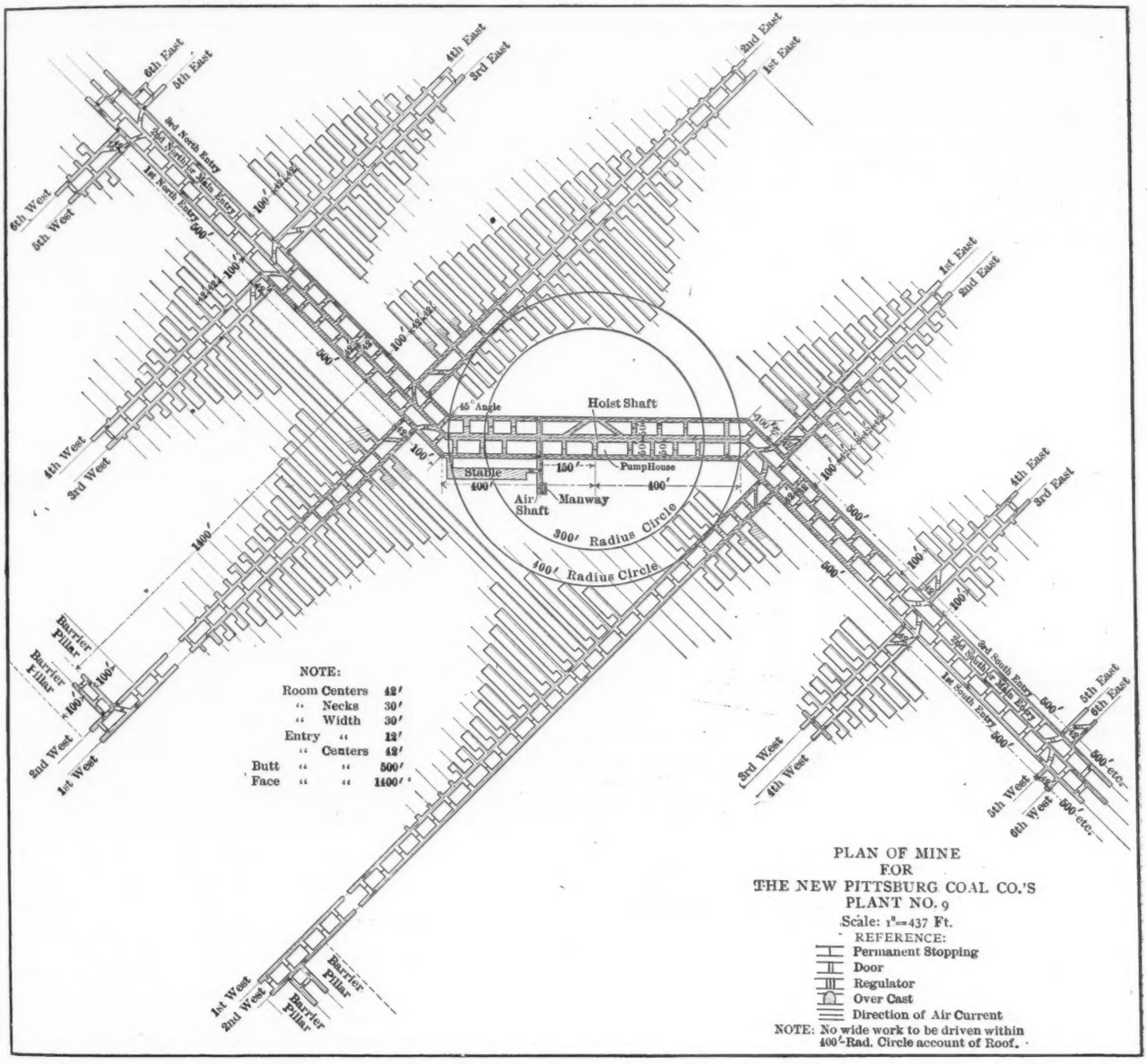
The coal seams in this district are not particularly gaseous, so that few accidents from explosions have occurred. At this mine the fan is of the Buffalo Forge reversible type, and is to be run as a blower, so as to prevent the shaft from freezing during the winter months. One admirable feature at this operation is the substitution of brick brattices for the ordinary wooden affairs usually built. The little water that is present is handled by a Weinman steam pump with a 7-in. suction and discharge. The shaft is 104 ft. deep and passes through a thick stratum of quicksand, which as before mentioned, makes the task of robbing difficult. The main shaft is 12x26 ft., and has three compartments; two of these compartments are cageways, and are 7 ft. 6 in. by 10 ft., while the other compartment is 7 ft. 8 in. by 10 ft.

Power Plant

The present plant includes six horizon-



tal tubular Borger Brothers' boilers, 72 in. by 18 ft. Each boiler is rated at 150 h.p. capacity. There are also three 150-kw. dynamos which are to furnish the power for haulage, lighting and machine mining. At present, the coal supplied to the boiler house and the ashes taken away are hauled with mules, but in the future it is expected to install mechanical conveyers to do this work. The feed water used in the boilers is heated by the exhaust steam and goes into the boilers at about 200 deg. temperature, which plan has met with success.



Surface Plant

The new Pittsburg Coal Company in planning and building the houses and surface plant at its No. 9 mine has endeavored to use all that previous experience has taught them, in producing as nearly as possible an ideal operation.

Fig. 2 shows the head frame and general arrangement when the shaft was sinking, and other preliminary operations were going on. In Fig. 3, the miners' houses are shown when only about one-half completed, while the general company store may be seen in the background on the right. Fig. 4 shows the power plant and the tipple, when completed, and after operations were started. The large cut here produced shows a detailed side elevation of the tipple and gravity screens. All necessary details, including the sizes of timbers, chutes, etc., are included.

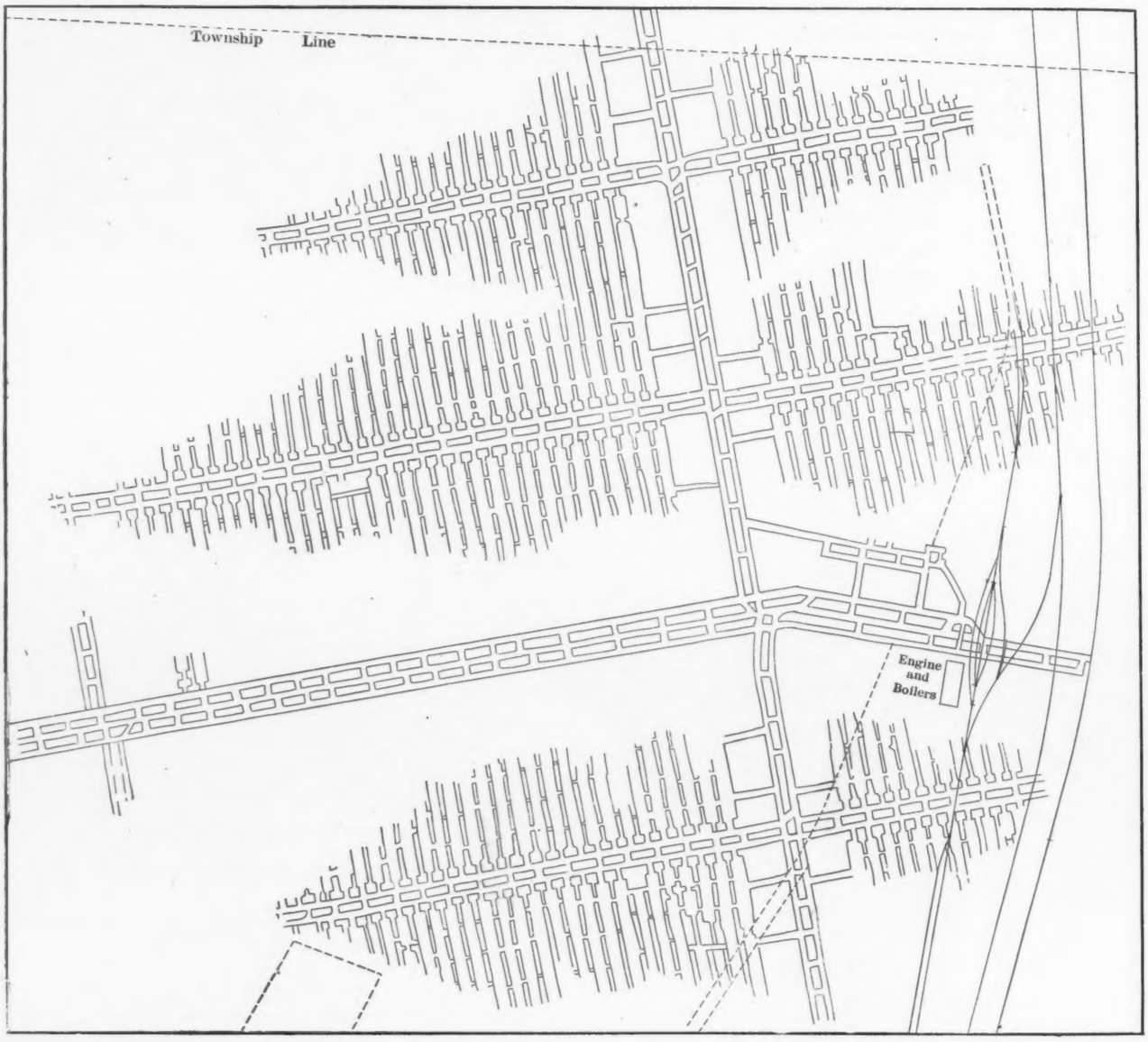
General State of the Industry

Coal mining in Ohio has rapidly advanced during the past few years and many experiments and much study have been devoted to the industry. The Sunday Creek Coal Company, which is probably the largest operator in the State, has been largely instrumental in developing the region to its present state of efficiency. Fig. 5 shows one of the first steel-constructed plants in any of the eastern fields. This operation, known as the Job mine, at Brush Fork, Ohio, is now nearly exhausted, and the only work carried on here at present is that of robbing the pillars. The mine was opened 24 years ago, although the steel construction has been in only about 12 years. In building this pioneer plant an effort was made to adopt mechanical stokers and have the storage bins over the boilers. All modern devices were supplied and no expense was spared to make the property one of the most modern mines in the country. During its best days the Job mine loaded about 3000 tons a day.

The Hocking coals are considered non-coking; there are, however, several washeries in the field that have been operated with success. Fig. 6 shows one unique arrangement for unloading slack coal from railroad cars and elevating it into

the washery, where it is jigged. The method of operation is to have a screw conveyer, which can be adjusted in hight, and have it deliver coal to a central point, where flight conveyers drag the coal up an incline and into the bins which feed the jigs.

The greater part of the Ohio coalfields is closely held by the large corporations, and what little coal is available sells for $100 to $200 per acre. Much of the Hocking coal is worked under lease, the royalties paid varying from 7½ to 12½c. per ton.



MAP OF THE ECLIPSE MINE NO. 3, JOHNSON COAL-MINING COMPANY, HOCKING, OHIO

According to statistics presented by F. Z. Shellenberg before the Engineers' Society of Western Pennsylvania 67 per cent. of the accidents in Pennsylvania coal mines are due to falls of roofs and sides, while only 9 per cent, are due to gas and 4 per cent. to explosives.

The California Mining Bureau

SPECIAL CORRESPONDENCE

Dr. A. Hausmann has been appointed Field assistant of the California State Mining Bureau by State Mineralogist Aubury to examine and report on the Greenwater copper deposits in Inyo county. Maps are to be made and descriptions compiled. The Bureau issued a few years since a bulletin on the copper resources of California, but since that time many important fields have been developed, among which is Greenwater. A revised edition of that bulletin will be issued as soon as the additional facts are ascertained by the field assistants of the Bureau.

The State Mining Bureau has just issued a map of the forest reserves of California compiled from data of the United States Forestry Service. Upon it are designated in colors established forest reserves, proposed forest reserves and national parks. It also indicates by the numbers the following established and proposed reserves: Monterey, San Luis Obispo, Pinnacles, Whitney Military Reservation, Stony creek, and the Lake Tahoe forest reserve. The total area of forest reserves in California is 19,035,810 acres. The following sections have the largest areas of forest reserves: Sierra, 5,049,934 acres; Santa Barbara, 1,981,323; Klamath, 1,896,313; Shasta, 1,377,126; Tahoe, 1,363,124; Trinity, 1,243,042; Lassen Peak, 897,115; San Bernardino, 737,120; San Jacinto, 668,160 acres.

Upper Burma is the only province of India which produces jadeite. In 1905 2685 cwt., valued at $1,227,370, were produced against 3778 cwt., $253,630, in 1904.

The Barytes Industry of the South

A Plant for Treating Barytes Need Not Be Expensive. A Common Error Has Been to Build Unnecessarily Costly Works

BY EDWARD K. JUDD*

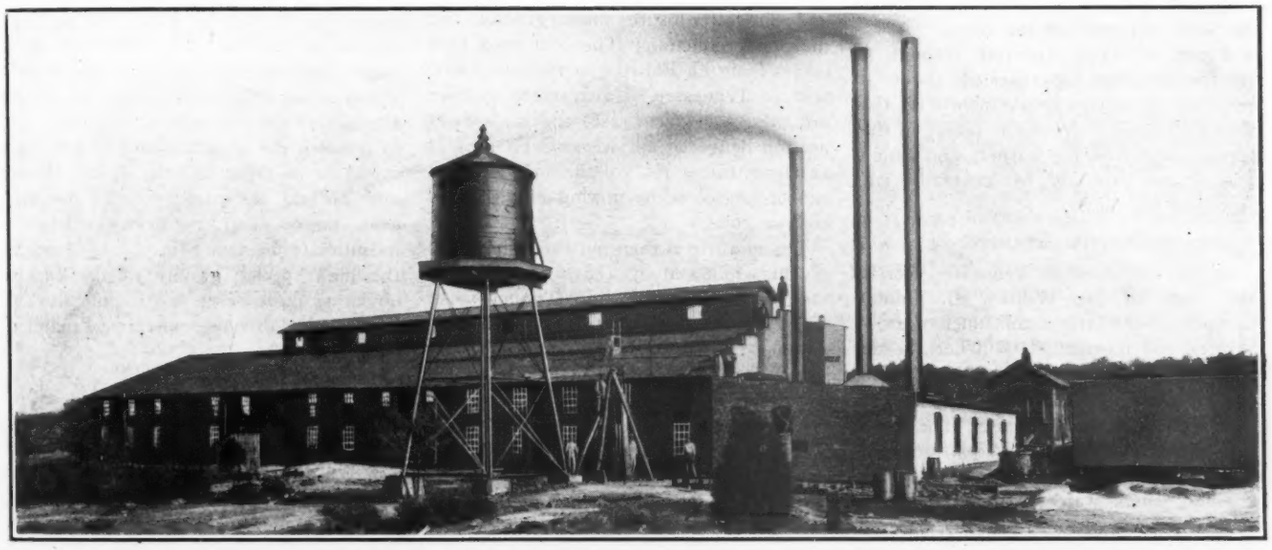
The entire barytes output of the United States at present comes from two distinct areas: Washington and adjacent counties of Missouri, lying southwest of St. Louis, form one area, while the other lies in the southern Appalachian mountain region, covering contiguous portions of Virginia, North Carolina and Tennessee. The latter yields to the former area in size of output for two reasons: Much of the Eastern product is inferior in quality to that of the Missouri district, while, at the same time, barytes mining, and particularly milling in the Eastern area have been prosecuted, in too many instances, without due regard to the big and little economies that are essential to the profitable working of such low-priced material.

The most common error of judgment has been displayed in overestimating either the market for finished material, or the output of crude obtainable within easy distance of the manufacturing point. In some cases, as at Honaker, Va., and at Bristol, plants have been erected, at an expense out of all proportion to the condition of the market, when it was known, or could easily have been ascertained, that the only available supply of crude material would have to be obtained from other operators and brought in by a long railroad haul. This is, of course, a legitimate, and often necessary, procedure in the treatment of a crude material found only in small and widely scattered localities, but the plant for treating barytes need not be expensive, and today, the only manufacturers who are making a fair profit are those who are within wagon-hauling distance of their mines, or are able, by receiving and shipping their materials over the same railroad, to secure the most advantageous transportation rates.

The accompanying photograph shows the plant of the Commercial Mining and Milling Company at Knoxville, Tenn., one of the important producers in eastern Tennessee.

Barytes in Tennessee

Unlike the Virginia ores, which frequently occur in distinct veins of crystallized barytes, the Tennessee ores are found irregularly scattered through the residual clay left by decomposition of the Knox dolomite, which, in its upper portion, is known to carry barytes throughcut much of its extent. The productive areas, as now developed, center around Sweetwater, on the Knoxville division of the Southern Railway, in southeastern Tennessee. The richest deposits are usually found on the summits of knobs and ridges, and consist of nothing but thick beds of stiff, red clay, carrying lumps and stringers of barytes, which follow no apparent rule as to position. The lumps vary from small nuggets to pieces of nearly one ton in weight, and extend from the surface down to the underlying dolomite. Bed rock has thus far been reached at only one point, where it was struck at a depth of 40 ft. below the summit of a gentle hill. The ore in some lumps has a translucent coarsely crystalline structure and in others a chalky appearance. In addition to a closely adhering coating of limonite on the outside, each lump is seamed with minute fissures, into which iron stains have penetrated. This objectionable feature of the ore is more pronounced in some deposits than in others, and its presence or absence is the predominating factor in determining the value of an ore. The factor next in importance is softness, and in this the Tennessee ores are about on equality with the notably soft Missouri ores. In some deposits the barytes is thickly incrusted with fluorspar, which is not a very troublesome element, and with brown hematite, which does give difficulty in subsequent treatment. Fragments of chert are a constant ingredient of the clay beds.



BARYTES MILL, THE COMMERCIAL MINING AND MILLING COMPANY, KNOXVILLE, TENN.

It has been suggested that, if the clay covering were removed and attention directed to the dolomite beneath, workable veins of pure white barytes, not contaminated by brown iron stains, would be found. While this view has never been disproved, it appears to be not well founded. As the clay has certainly been derived from the dolomite—traces of the original stratification are frequently visible in it—a certain amount of concentration of the resistant barytes has occurred, so that the clay probably carries a greater proportion of barytes than the original rock. Then the lateral distribution of the barytes lumps would argue in favor of a similar distribution in the rock, since this region is far removed from that

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affected by the glacial period. Finally, mining in clay is so much cheaper than work on the same scale in rock, that no attention need be wasted on this question as long as the clay deposits remain, and in spite of a lot of indiscriminate digging these have by no means yet been exhausted.

Barytes Mining

The working methods employed at the deposits are simple in the extreme. A cut, wide enough for a dump-cart, is driven into the slope of the hill until a satisfactorily rich spot is found. The clay banks are then dug down with pick and shovel, the lumps of barytes picked out and the refuse carted away and dumped. The lumps are spread on the ground, or on a board platform, and allowed to remain until sun and rain have loosened the adhering clay, when they are scratched over to remove most of the dirt, forked into wagons, and hauled to the railroad, or cleaning or grinding mill. In this way, about half the output is lost, for the soft barytes easily breaks away into fine pieces which go through the fork and stay on the dump. A recent run of dump material through a five-compartment jig revealed about 30 per cent. of barytes recoverable with this simple treatment. Water is scarce in this region; otherwise log-washers and simple jigs would probably be generally employed at the mines.

Barytes Cleaning

In the southeastern Tennessee district the plant of the William D. Gilman Company is the largest consumer of crude barytes, and its methods will here be described. The impurities in the ore coming to this plant are clay, fluorspar, chert brown hematite and limonite. The ore is unloaded from wagons to a platform and then passes through a Carterville jaw-crusher, where water is added to insure smooth flowing of the still sticky material. From the crusher the stream falls through a pair of geared rolls, 15-in. face, and is then elevated to the head end of a jig. This jig possesses no peculiar features. Its five cells are each 2½ ft. wide and 3 ft. long; the screens are of 6-mesh, iron-wire cloth, and are allowed to bed themselves. The coarse concentrates are drawn off through side discharges; one-half or more of the clean barytes goes into the hutch, owing to its softness, and is there recovered. In the tailings, fluorspar and chert pass off without the least difficulty, but the hard rinds of brown hematite, having a high density, remain obstinately in the concentrate. Magnetic separation has been suggested and experimented upon to a limited extent, thus far without results. This method would appear to be the rational solution, since the hematite readily breaks loose from the barytes, and a moderate heating would both decripitate the barytes and render the iron oxide magnetic. The brown stains of limonite are nearly all removed by the jigging, which rubs them off from their holding places; the completeness of their removal can be determined by the fineness of the crushing. The concentrates from this jig are shipped to other manufacturers for further treatment.

Barytes Roasting

This same plant is equipped for the roasting of barytes, which is the first step in the manufacture of barium salts. The barium sulphate is reduced to sulphide, this is dissolved in water, and from this solution any desired salt is precipitated, or recovered by concentration. In ore intended for this process, a higher proportion of impurity can be tolerated, since only the barium reduction product is soluble in water.

The crude ore is mixed, on the receiving platform, with coal, in the proportion of four of barytes to one of coal. The coal for this purpose should be low in ash, and not too volatile; the former qualification avoids the subsequent treatment of a mass of inert, though harmless, material, and the latter insures a more gradual and thorough reduction. The coal used here comes from La Follette, in the Jellico district of Tennessee, is guaranteed to have not over 3 per cent. ash, and costs $1.75 per ton delivered at Sweetwater. It is, if anything, rather too volatile, but this fault can be overcome by mixing it with hard coal, or coke.

The mixture is then put through a jaw-crusher, followed by a Sturtevant emery mill, and then elevated to a hopper over the center of a cylindrical, horizontal, revolving furnace, driven, through cog wheel and pinion, by a small independent engine. The furnace has an outside diameter of 12 ft., and a length of 18 ft., is supported on two tires resting on rollers, and is lined with two courses of fire-brick. A fire-box is at one end, and at the other the heat passes under boilers which supply power for the plant. This heat is amply sufficient to provide 125 h.p. The charging door is on the side of the cylinder, at its middle. A space is left underneath to receive the discharge.

The roaster is charged with 1.3 tons of mixture, every three hours, or eight times a day. In addition to the coal in the mixture, only 1,3 tons of coal are required per 24 hours, in the exterior fire-box. Carbonate begins to form as soon as the first sulphide appears, so that roasting must not be unduly protracted. The clinker from this furnace contains 65 to 68 per cent. of sulphide, soluble in water, and is sold on guarantee of over 60 per cent. solubility. Additional equipment is now being installed to leach this clinker, all of which has heretofore been shipped as made, and to manufacture barium salts. The carbonate in the furnace clinker, though insoluble in water, is easily dissolved in nitric or hydrochloric acid, and the corresponding salt recovered.

Barytes Bleaching

Of all the barytes products, the one now in greatest demand is No. 1 grade of ground barytes, which is of pure white color. The supply of ore, which, if ground without any other treatment, would yield No. 1 product, is, however, exceedingly limited, and resort is therefore had to a bleaching process, and even with this treatment, a superior grade of crude must be employed. The apparatus and methods used in this process have been recently described[1], and need not be here further referred to. The simplest method, as practised at the Lynchburg, Va., works belonging to Nulsen, Klein & Krausse, is to crush the ore to 1 in. or less, which is then put into a vat and treated with dilute sulphuric acid and steam for 12 hours. The solution of iron sulphate is drawn off and run to waste, while the cleaned ore is washed and then dried in a mechanical oven. With the particular ore now treated at this mill, which is a grayish, hard and finely crystallized barytes, no advantage is gained by leaching it for more than 12 hours. In regard to the size to which the material should be crushed before bleaching, it might be supposed that any crevice that would admit iron-bearing solutions would also permit the entrance of sulphuric acid to dissolve the iron, and this is generally found to be true. At the Point Mining and Milling Company's works, in Missouri, the ore is ground nearly or quite to its ultimate fineness before it is bleached, the high specific gravity of the barytes obviating most of the usual difficulties in the leaching of finely pulverized material.

Barytes Grinding

Whether required for the paint or the rubber trade, barytes must be finely ground, and for this purpose no machine has yet displaced the ancient buhr-stone. Disintegrators have been tried, but their best product, after repeated passes, falls far short of the required fineness. At the Lynchburg plant, the ore, after drying, is passed through as many as seven buhr-mills, one after the other. After the third mill, only an expert can distinguish the successive degrees of fineness. After the last mill is passed, the powder is bolted through cloth and shipped in bags and barrels. A sugar barrel holds 700 to 800 lb., while as much as 1100 lb. has been put into one cask.

The ores of the various districts vary greatly in softness and thus offer greater or less difficulty in grinding. The Missouri ores are probably the softest in this country, and not much inferior to those of Germany. The Tennessee ores are not much harder, but most of the Virginia product is difficult to grind.

The demand for barytes was never so vigorous as at present, and as but few grinders or other consumers operate their

[1] Engineering and Mining Journal, Mar. 9, 1905. *Engineering News*, Feb. 23, 1905.

own mines, the producers of crude barytes hold the key to the situation, and will, in many cases, be justified in working their deposits on a larger and more elaborate scale.

The Manufacture of Hydrofluoric Acid

By Anson G. Betts*

No very useful literature on this subject exists to the best of my knowledge. Most chemists regard it as an extremely dangerous substance, and have presumably left it alone as much as possible. Yet hydrofluoric acid and fluorides have an extending use, for numerous purposes. Its preparation is easy, and safe if proper precautions are taken.

Samples of fluorspar may be tested by mixing say 50 grams with various proportions of 66 deg. sulphuric acid in small sheet-iron pans, and distilling under the hood. For preparation in small quantities for the laboratory, apparatus as shown in Fig. 1, gives good results if used out of doors. The retort is an ordinary cast-iron pot, perhaps one foot in diameter and 6 in. deep. The cover is made by filling with sand to near the top, leveling it off and pouring in about ½ in. of lead. The lead pipe is separate from the cover, and passes over to a lead hydrofluoric-acid bottle containing water. The water must not come as high as the end of the lead pipe.

During distillation, the bottle is sprayed with water from a hose to keep it cool. A charge of about 2 kg. of fluorspar and 2.5 kg. H_2SO_4, 66 deg. is stirred up in the pot. The fluorspar, for the most part, dissolves immediately on stirring in the sulphuric acid, without evolution of much fume, until heat is applied. The cover is put on and dry cement put over the joints as a lute, cement being suitable for this purpose.

The heating should be moderate at first to prevent too much frothing in the pot. Distillation takes 2 or 3 hours, and the end can be told by feeling of the lead pipe near the bottle, which is hot as long as acid is coming over. Very little loss is experienced and a yield of 80 per cent. or thereabout, is obtained.

Operation On Larger Scale

On a large scale, the application of the same principles is successful. The general arrangement is shown in Fig. 2, for which a few explanations are necessary. The pot may be cast about 8 ft. in diameter, 3 ft. deep at the center, and 1 in. thick, with a slightly curving bottom to prevent cracking. For the pot a cast-iron cover 1 in. thick is used, dipping into the annular trough around the pot, which contains strong sulphuric acid as a seal. All the other seals are made in the same way, but water may be used for the joints on the condensers where the temperature is not so high. Lead retorts, and lead covers for the retorts are useless.

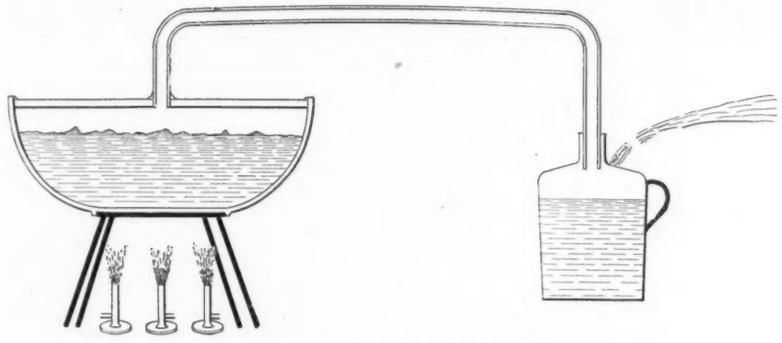


FIG. 1. LABORATORY STILL FOR MAKING HYDROFLUORIC ACID

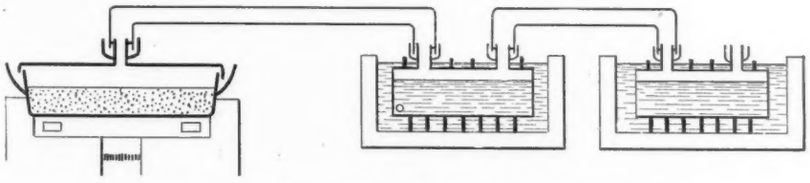


FIG. 2. PLANT FOR THE MANUFACTURE OF HYDROFLUORIC ACID

The condensers consist of a series of two or three lead boxes of about 1 cu.m. capacity, entirely submerged in a water tank and partially filled with water or dilute HF. Condensers should be made of heavy lead, supported by wooden pieces to which the lead is attached by means of lead straps burned on. The lead delivery pipes may be about 5 in. in diameter. The condensers have an overflow so that the acid never can rise to the end of the delivery pipe. If this happened, a partial vacuum might result, and draw water back into the pot, where it would probably cause an explosion.

The charge may consist of 1000 lb. of ground fluorspar and 1000 to 1200 lb. 66 deg. sulphuric acid. SiF_4 comes off first and deposits silica on the water in the first condenser, stopping absorption somewhat so that it is necessary to stir the water in the first condenser until most of the SiF_4 has come over. The pot may be charged in the morning and distillation finished by night. Coal is used for fuel, burned on a grate of about 3 sq.ft. The residue in the pot is comparatively hard, and, after cooling, is dug out with pick and shovel. The yield of acid calculated on the sulphuric acid used is approximately 80 to 90 per cent.

The cost of manufacture is not great, the principle items being the raw materials necessary. To produce 1 lb. anhydrous HF, about 2½ lb. of fluorspar and 3 lb. sulphuric acid are necessary. Fluorspar and sulphuric acid are worth about $10 to $15 a ton, making a cost for raw materials, exclusive of coal, of approximately 2¾ to 4⅛ cents per pound anhydrous HF.

Method of Analysis

The sample of acid is mixed with several times its bulk of nearly saturated and neutral potassium nitrate solution. This causes a precipitation of potassium fluosilicate in the solution. Phenolphthalein is used as indicator and the solution titrated with caustic soda in the cold. This gives the total of the HF and H_2SiF_6 present. The sample is then heated to boiling when it will be found that considerable more caustic soda may be run in to get another end point. In the first titration, the HF present and the HNO_3 liberated by the reaction of potassium nitrate and fluosilicic acid, are neutralized by the alkali. When titrated hot, the precipitated K_2SiF_6 is decomposed by the alkali. The following is the equation involved:

$$K_2SiF_6 + 4NaOH = 2KF + 4NaF + SiO_2 + 2H_2O$$

The rule for calculating is, 1 gram NaOH used in the second titration = 0.9 gr. H_2SiF_6 in the sample. For HF present divide the number of c.c. of NaOH used in the second titration by 2, and subtract the result from c.c. used in the first titration. The remainder shows the HF, 1 gram of NaOH equaling 0.5 gram HF.

Hydrofluoric acid has been shipped in beer barrels with rosin lining, which are entirely successful and last for some time and for long shipments; also in rectangular lead carboys. Its storage in lead is not very satisfactory on account of the corrosion of the lead. Probably the presence of sulphuric and fluosilicic acids has some effect in the corrosion.

I am indebted to Dr. William Valentine for some of my data.

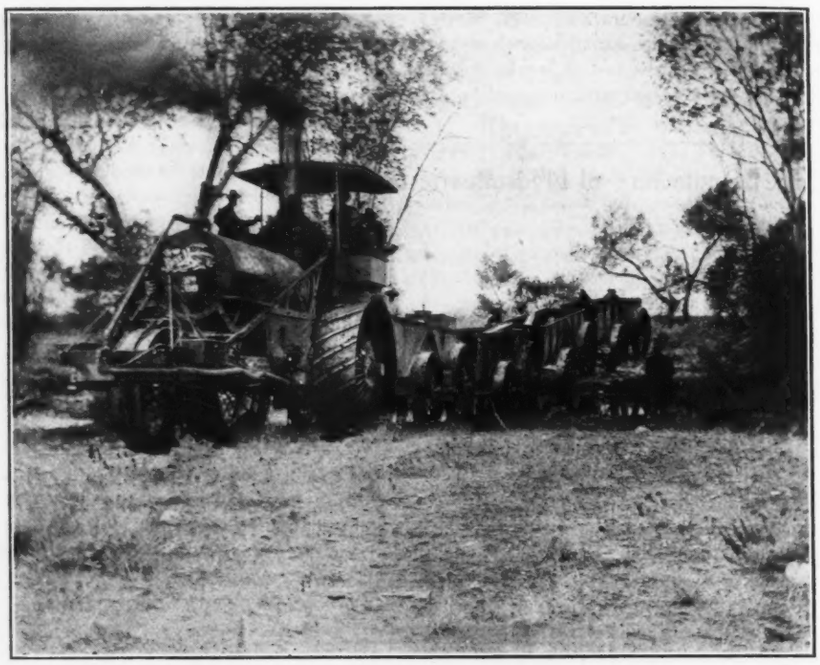
*Consulting chemist, Troy, N. Y.

Traction-engine Haulage in Idaho

By Robert N. Bell *

Ore haulage by traction engine has recently been introduced in Idaho by a subsidiary company connected with the Gilmore Lead Mining Company, Limited, of Lemhi county. The Gilmore company has large deposits of high-grade lead carbonate ore and shipped 1500 tons of crude ore and concentrates containing 60 per cent. lead and 30 oz. silver during 1906.

The property is situated 85 miles from the railroad shipping point which is Dubois, a station on the Montana division of the Oregon Short Line, and the ore has been hauled by teams at a cost of $10 to $12 per ton. However, owing to the excessive demand for horseflesh, brought about by the extensive new irrigation works now in process of construction in the Snake River valley, the company has found it impossible to get sufficient teams to handle the output and during last summer a separate company was organized, known as the Dubois & Salmon Transportation Company, for the purpose of handling the output of this and other mines of the Gilmore district.



TRACTION-ENGINE ORE TRAIN FORDING STREAM

The Equipment

This new company put a "Best" California traction train on the road, consisting of a traction engine of 110 h.p. and four steel wagons of 15 tons capacity each. The country between the Gilmore mine and the railroad shipping point, with a little bridging across creeks and irrigating ditches, is an ideal one for this service, consisting, as it does, of a flat valley bottom and desert plain, presenting an old lake bed surface of fine gravelly or gritty soil and small sage brush.

The train made four trips during the fall, during which the engine was put to a very severe test, and was made to ford the several streams on the route which muddied up the gear and caused considerable delay. The worst streams have since been bridged, and it is anticipated that the venture will prove a great success during the coming season, reduce the former cost of hauling the ore fully 50 per cent., and still show good earnings.

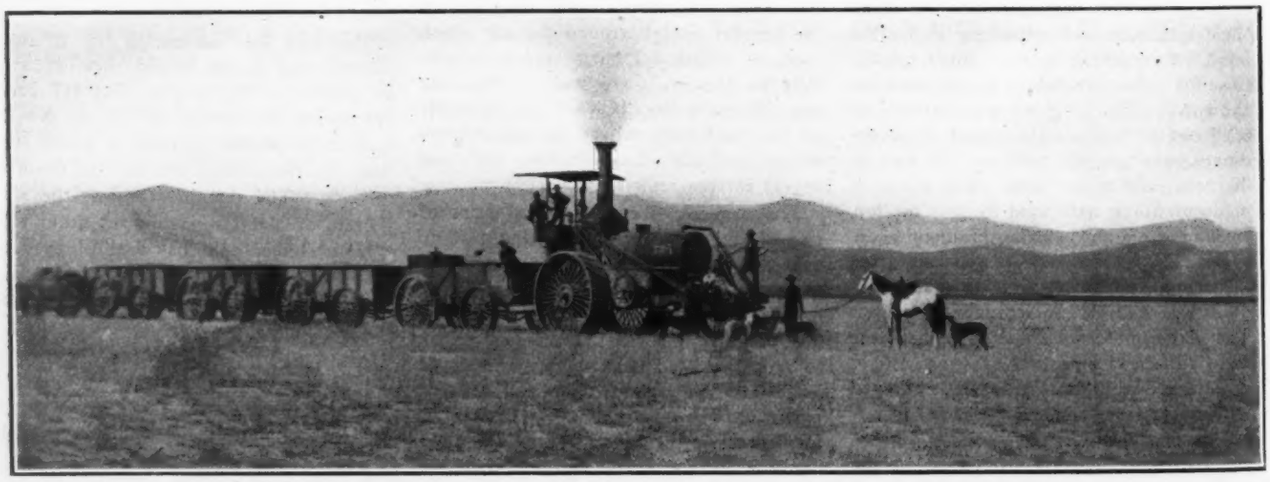
The trips already made with the road practically in its virgin condition, consumed four days running time for each round trip, hauling a 40-ton load of ore out and a like amount of back freight in. The train travels night and day, using a large acetylene head-light. It requires a crew of three men on each shift; engineers receive $6, firemen $4, and swampers $3.50 per shift, and work twelve hours, the off shift sleeping in a wagon trailed behind the ore cars.

Costs

The engine uses, under present conditions, 4 tons of Wyoming coal in 24 hours, which costs $6 per ton, the coal being distributed in bins along the route on the back trip. Water is available at convenient intervals of not to exceed 15 miles, for which its tank capacity in the front of the first ore car, is good.

The nature of the roads is such that they never get very muddy, and as soon as the snow goes off in the spring, the ground rapidly dries and hauling can begin. There is one hill going to the mine from the valley three-fourths of a mile long and 10 per cent. grade. The engine handles one loaded car or the train of empties up this grade without any difficulty, and sets the cars at the loading bin one at a time on a 15 per cent. grade.

*State mine inspector, Boise, Idaho.



TRACTION-ENGINE TRAIN CARRYING ORE FROM GILMAN CAMP, IDAHO

Petroleum in Illinois

By H. Foster Bain*

The important oilfields now being developed in southeastern Illinois first attracted attention in 1865. At that time about a dozen wells were drilled within what is now knowun as the Casey district. These wells were drilled with little if any casing, and the water in the holes so held back the oil that the small showing discouraged the operators and the attempt was abandoned. In 1904 drilling in this territory was resumed, the work being taken up by J. J. Hoblitzell & Son, of Pittsburg. Small amounts of oil and some gas were found in April in the first hole drilled, and in October the second well came in as a 45-bbl. producer. Since that time the development of the field has been rapid. The productive territory has expanded to the northwest and southeast, until it now stretches from Coles to Lawrence county. The principal production is from Clark, Cumberland, Crawford and Lawrence counties. The northern field, lying mainly in Clark, but including a portion of Cumberland county, is known usually as the Casey or shallow pool. The wells stretch from Westfield on the north to the south boundary of the county. The Crawford county pool crosses the entire county, and in Lawrence county productive wells have been found to a short distance south of Bridgeport. Commercially three districts are recognized, as is shown in the following table of wells producing on March 1, 1907:

PRODUCING WELLS, MARCH 1, 1907.

Clark and Cumberland counties, Casey district	2085
Crawford county	932
Lawrence county	194
	3211

In each several pools are recognized. For example, within the Casey district are the Westfield pool to the north, the Siggins to the northwest, and the Johnson township pool to the southeast. The general distribution of the productive territory is shown in the accompanying map. It may serve to orient this if it be noted that the field extends approximately from the St. Louis line of the Big Four Railway to the main line of the Baltimore & Ohio Southwestern. It is crossed also by the Pennsylvania, Illinois Central, and the Cincinnati, Hamilton & Dayton, while the Cairo line of the Big Four runs from north to south, just east of the productive territory.

GILMAN CAMP, IDAHO, SHOWING GRADE MET IN HAULING ORE

Pipe Lines and Production

The field is now served by the pipe lines of the Ohio Oil Company. An 8-in. line extends from Bridgeport on the south to Martinsville, a second one being under construction. At Martinsville the lines from the Casey district are joined, and two 12-in. lines extend to Montpelier, Ind., where a connection is made with the main east-west lines of the Standard Oil Company.

Shipments began in June, 1905, with 5489 bbl. At the close of that year 156,502 bbl. had been sent out, tank cars being used. In 1906 the pipe lines were connected up and 4,626,835 bbl. were sent out. In addition, tank car shipments were made by the Sun, Pure and Cornplanter companies. In January the pipe line runs were 752,670.62 bbl., and in February the business of the Ohio Oil Company was reported as follows:

	Barrels.
Cross stocks	2,756,740.16
Runs from wells	918,620.35
Regular deliveries	1,013.57
Delivered to other lines	451,032.39

It may be noted that the runs for February averaged 32,808 bbl. per day, 3066 bbl. in excess of the receipts from the Lima oil districts of northwestern Ohio and Indiana. The oil is now selling for 68c. and the pipe lines are not yet able to take all that is offered. With the opening of spring the second line to Bridgeport is to be connected up and other improvements made with a view to handling the product. In the meantime a refinery is being built at Alton, and small plants are said to be planned for near St. Louis, Mo., and at Robinson, just east of the field.

Characteristics of the Field

In general the field includes few flowing wells and no gushers. The wells are usually shot and most of them must be pumped. They hold up under pumping extremely well so far, and in a particular case 2000 bbl. per acre have been won in six months, with the tract only about half drilled. In a number of cases the wells have furnished enough oil to pay for themselves by the time they were connected up. In Johnson township of Clark county the average initial production of six wells was 57 bbl., the range being from 15 to 200. In the Bridgeport pool the average of 17, including one dry hole, was 106 bbl., the maximum being in this case 245 bbl. Wells running as high as 1500 bbl. are found, and a number have run up to 1000.

An examination of the accompanying map will show certain striking features characteristic of the entire field. The most pronounced is its extreme irregularity. It is very "spotted," to use the local phrase. Strips and patches of barren and productive territory are interwoven in a very intricate manner. In many cases dry holes are drilled in territory completely surrounded by productive wells, and within 400 ft. of a good well one may prove entirely barren. The map also brings out the fact that the pools follow a general northwest, southeast line. This, when extended, touches the Princeton-Indiana field to the south and the well-known Lasalle anticline to the northwest. It seems reasonable to believe that it is related in some way to this structural feature; the more so, since field observations show that within the oil territory there is a slight doming of the beds along this line. A third characteristic, not shown by the map, is the erratic distribution of gas. In Lawrence county the wells so far opened show almost no gas. In

*Director, Illinois Geological Survey, Urbana, Ill.

the other counties a small amount of gas is found with the oil, not in general enough for pumping and drilling. In addition there are scattered gas wells which produce no oil. These wells have good pressure and volume, the latter running up to over 700,000 cu.ft. per day, but they seem to be short lived. Individual wells, when connected up and used, have lasted from a few days to three or six months. The gas is being used locally, but the present available supply does not encourage the laying of big gas mains.

Differences among the Districts

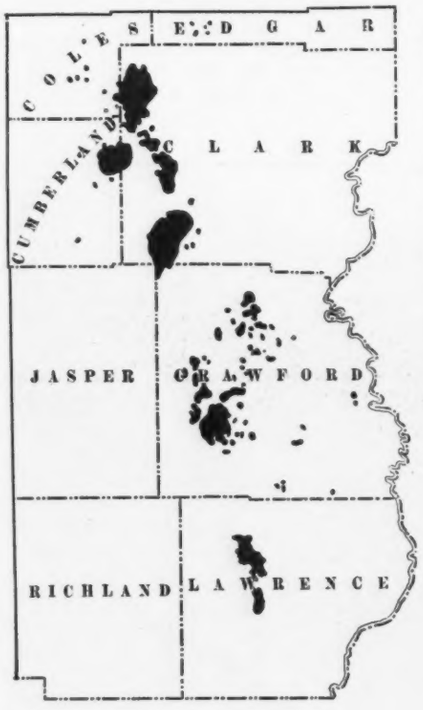
In certain particulars the three districts differ. The Casey district is shallow, the wells ranging from 325 to 400 ft. The productive horizon is in the Coal Measures, the "sand" being in part a dolomite, resembling the Trenton rock of Indiana in appearance, and in part a true sand. Owing to the shallow depth and consequent low cost of the wells (approximately $1500) this field has been very rapidly explored. The principal gas production is from Johnson township. The wells here supply Casey, Martinsville and Marshall. In Crawford county a deeper sand is found, the depth being approximately 900 ft. Gas is commonly found with the oil. The productive sand seems to be in the Chester formation, presumably representing the Birdsville horizon. It is often a sandy shale, and frequently consists of several beds of sand separated by shale. The Casey sand is thought to be recognized in several of the wells, approximately 240 ft. above the Crawford sand. It is not generally productive.

In Lawrence county three pools are recognized; the Lewis, Petty and Bridgeport. The first well was brought in about seven month ago, and there are now 160 wells producing. They range in depth from 1300 to 1450 ft., and the oil comes from a sand about 400 ft. below that of Crawford county. It is coarser grained, and so far is seemingly more regular. Of 40 wells drilled in the town of Bridgeport, only two proved dry. There is a strong salt water flow, and the oil pours out at the surface in a steady stream which is highly satisfactory.

Future Development

As may well be imagined the discovery of these oilfields has led to a large amount of wild-catting in other parts of the State. Oil was found some years ago near Litchfield, in Montgomery county, and gas has been known at Sparta in Randolph and at Pittsfield in Pike counties. All these areas are being redrilled. Within the year small amounts of oil have also been found at Tolono, in Champaign county, at Iola, in Clay county, and at various points in Jersey, Saline and other counties. Next summer there will undoubtedly be a large number of drills going in outside territory, and it is expected that several new pools will be discovered. Just at present attention is being concentrated on a small pool being developed near Duncanville, in eastern Crawford county, and another north of Mermon, in Sullivan county, Indiana.

The geology of this area is as yet too little understood to warrant any attempt at prediction. A preliminary report, giving conditions up to May, 1906, was prepared for the Illinois Geological Survey by Prof. W. S. Blatchley, and issued as



PETROLEUM FIELDS OF ILLINOIS

Bulletin No. 2. Further studies will be carried on in this field during the coming season.

The Michipicoten Iron Range

In the annual report of the Ontario Bureau of Mines for 1906, Dr. A. P. Coleman contributes a paper on the "Iron Ranges of Eastern Michipicoten." This deals principally with the region south and southeast of the Helen mine, and with some isolated bands of the formation to the north. Dr. Coleman notes the discovery of a range of considerable magnitude about two miles to the northwest of the Helen mine, in a locality which was supposed to have been carefully explored. This has been stripped and made accessible by Alois Goetz, who has taken a number of claims upon it. The range is known to extend 1¾ miles in a direction somewhat south of west and to have in places a width of 500 ft. with some schist intermingled. Part of the range rises with the usual steep ridges, but other parts are in low ground and more or less covered by drift. The formation includes quartzitic and also granular silica—often with magnetite enough to disturb the compass greatly—pyrites, porous black slate and schistose siderite, almost all the forms occurring at the Helen mine. All the features of the Helen mine seem to be repeated, except that the band is only about half as wide; but thus far no important mass of ore has been found. Two or three miles south of the Mission near the mouth of the Michipicoten river, a number of small areas of iron formation occur, on or near Bridget lake, the locations being generally spoken of as the Blackinton claims. A band in this locality may be followed for about 500 ft., but with very unequal width. It has been stripped at various points, showing in some cases black, cherty-looking material heavy with magnetite; in others sandy-looking rock with little ore. What is probably an extension of these bands of iron formation occurs about a mile west on the shore of Lake Superior. It is lean and sandy-looking. South of Bridget lake small outcrops occur at a number of points. To the west of lake Mijinnemungshing, in the extreme southern portion of the area explored, a number of claims have been located on iron formation. Inland from the shore of an exposed bay about two miles southeast of Cap Choyyé a small deposit of impure hematite occurs, but without the usual rocks of the iron formation. The ore is generally bright red hematite, or to a less extent black with no magnetite; but the amount to be seen is too small to give the deposit practical importance.

An interesting development of the iron formation just east of Lake Anjigomi has been stripped and exposed, disclosing coarsely banded silica with magnetite, thrown into sharp folds and associated with bands of green schist. There are three strips of iron formation with a total width of 27 ft.; on a hillside to the east the formation widens to about 60 ft. and the character of the formation changes, becoming heavy with magnetite. The richer parts of the iron formation seem heavy enough to form ore of fair quality. Other deposits are on the northeast side of Lake Mishewawa, two miles east of the same lake; and a series of outcrops near the High Falls of Michipicoten river. The latter band has an average width of a quarter of a mile, running across the country to the Magpie river. Some parts show little iron, while in others banded silica and carbonates are found. The paper also contains a description of the Helen mine and much detailed information regarding the pyrites deposits of the district explored.

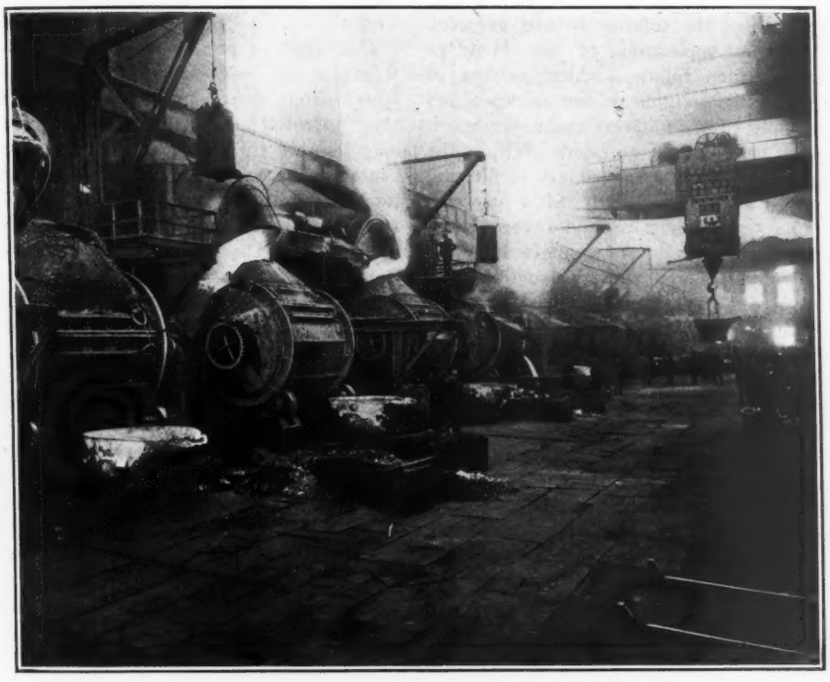
Converters of the Washoe Smelting Works

The converter department of the Washoe smelting works described in a pamphlet prepared by members of the Anaconda Copper Mining Company staff has 11 converter stands. The converters used are the horizontal barrel type, 8 ft. in diameter and 12 ft. 6 in. long, and are operated hydraulically. The building is equipped with two 60-ton electric traveling cranes, one for handling converters, the other for handling slag and copper from the converters. There are also two 15-ton electric cranes in the casting department for general use.

The matte is brought from the blast furnaces and reverberatories to the charge cars and transferred to the storage bins for blast-furnace use.

The blister copper is poured into a sheet-steel clay-lined ladle and taken by the crane to a hydraulic cradle from which it is poured into the casting furnace.

The converters are lined in the main building, but the lining material is prepared in a separate building. The lining material is highly silicious ore, containing gold and silver, and slime from a settling pond is used as a binder. The material is crushed by a Blake crusher and fine rolls, sized by trommels and sent to the bins, which feed 4 Carlin 7-ft. grinding and mixing pans. Here it is ground and mixed to the proper consistency and then transferred to the converter where it is tamped around a steel form by a special Ingersoll-Sergeant tamping machine, 5-in.



CONVERTER DEPARTMENT, WASHOE SMELTING WORKS

floor, which is 23 ft. above the operating floor. The matte is poured from the ladle into a launder, the end section of which is pivoted so that it can be turned out of the way when the converter is filled. The converter is filled in a nearly vertical position with the air blast on. Seven tons or matte per charge are used whether the converter is freshly lined or not and the charge is finished to blister copper in the same converter.

The slag is poured into unlined cast-steel ladles and taken by the crane to a casting machine of the platform-conveyer type, having pressed-steel molds. This slag ladle is placed in a hydraulic cradle from which the slag is poured into the molds, chilled by sprays of water and conveyed to a steel bin outside of the building, from which it is loaded into railroad diameter and 20-in. stroke. This tamping machine is supported by a revolving jib crane, the vertical motion of which is controlled hydraulically. After lining, the converter is removed to the drying stand by the crane, where it is dried with coal and scrap wood.

Utah Consolidated Mining Company

This company owns a large property in the Bingham district in Utah, which it is working and developing on a large scale. Its latest report is for the year 1906. The general account shows: Capital stock, $1,500,000; accounts payable, $126,291; general reserve, $510,144; profit and loss surplus, $2,451,228; total liabilities, $4,587,663. On the other side are property accounts, $1,566,692; accounts receivable and stocks on hand, $2,976,984; cash, $43,987; total assets, $4,587,663. There was no change in stock during the year.

The income account for the year is given as follows:

	Amount.	Per Ton
From sales, etc.	$4,606,915	$15.51
Expenses and charges	1,771,907	5.96
Net earnings	$2,835,008	$9.55
Dividends paid	$1,500,000	
Transferred to gene'l reserve	350,000	
Total appropriations	$1,850,000	
Surplus	$ 985,008	

Adding $1,466,220 brought forward from 1905, made a total surplus of $2,451,228. Deducting the value of the gold and silver, the average given by the receipts was 18.01c. per pound of copper. The averages above are computed on the tonnage smelted.

President Broughton reports, in part, that developments at the mine continue to be satisfactory, the sulphide ore in sight being 1,100,000 tons, the same as on Feb. 5, 1906. There was mined 277,874 tons of sulphide copper ore, 677 tons of oxidized gold ore, and 235 tons of lead ore, a total of 278,786 tons.

The smelter treated 279,737 tons of sulphide ore, 676 tons of oxidized ore, and 16,576 tons of custom ore, an average of 766.4 tons per day of sulphide ore. The product of the ores was 18,994,816 lb. of bullion, and the bullion, when refined, yielded 18,533,974 lb. of fine copper, 457,812 oz. fine silver, and 42,601 oz. fine gold. Of the refined product, the custom ore yielded 170,000 lb. of fine copper, 3271 oz. of fine silver, and 15,110 oz. fine gold. For the total ore smelted the averages were 3.2 per cent. copper, 1.54 oz. silver, and 0.143 oz. gold per ton.

Manager R. H. Channing, Jr., reports that during the year 10,732 ft. of exploring and development work was done—8007 ft. in rock, and 2725 ft. in ore. This work was confined principally to the upper levels, and resulted in the development of about 280,000 tons of copper sulphide ore. The most important development of the year has been what is known as the Pacific orebody, in the western end of the present mine workings, and at an elevation of about 150 ft. above No. 5 level. Here a large flat orebody of exceptionally good grade was opened up and about 175,000 tons mined from it during the year. Apparently this orebody extends westward, beyond a well-defined fault line, into ground never before proven productive, and this makes very promising the territory to the west. The tonnage of sulphide copper ore in sight is estimated at 1,100,000 tons.

According to a U. S. consular report, thorianite, one of the rarer minerals, has been discovered in a river bed of Ceylon. Quantities of the mineral have been mined, and have sold at $8500 per ton.

Cyanide Practice at the Reliance Mill

The Plant at Nelson, B. C., Treated 50 Tons of Ore per Day and Employed the Hendryx Process, Agitation, Settling and Decantation

BY DOUGLAS LAY*

The process of slime treatment evolved at the Reliance Gold Mining and Milling Company's plant on 49 Creek, Nelson, B. C., possesses certain features of interest, inasmuch as it is the only plant of its kind in the Dominion.

Character of Ore and Reduction

The ore treated is a decomposed quartz containing a high percentage of hydrated iron oxide and from 5 to 25 per cent. iron pyrites, while the gold values average about $4 per ton. The ore is conveyed from the mine to the mill by a Riblet aërial tramway. From the lower terminal bin, the ore passes over a grizzly to a 9x15-in. Blake crusher. The undersize from the grizzly goes directly to the mill-feed bin, while the oversize after passing the cross-bar goes to geared rolls which are 14x36 in., and thence to the feed bin. The maximum size of ore in this bin is ¼ in.

From the feed bin, the ore is fed by an automatic feeder to a 6-ft. Chilean mill, Akron make, by which it is crushed to 60 mesh, in an alkaline cyanide solution of a strength of 0.02 per cent. KCy.

Arrangement of Plant

The pulp, in the proportion of 1 to 3 of solution, passes from the Chilean mill into settling tanks provided with pyramidal bottoms and central plug discharges. There are 10 of these settling tanks, each having a capacity of 6 tons of pulp. The greater part of the slimes settles in the first two tanks, the solution gradually getting clearer as it passes from tank to tank. Settlement of the slimes is aided: first, by the addition of slaked lime; second, by baffling boards, so disposed in the settling tanks as to prevent any direct flow from tank to tank, and third, by heating the solutions, which are kept at an average temperature of 70 deg. F.

The overflow from the last tank of the series is practically clear, but for additional clarification it is passed through two other tanks having a combined capacity of 32 tons. The clarified solutions then flow through electrical precipitation tanks of which there are three, each 35 ft. long, 5 ft. wide and 3 ft. deep, containing about 3500 sq.ft. of cathode surface. After precipitation the solution passes to a sump from which it is elevated by a centrifugal pump and returned to the storage tank above the Chilean mlil.

When about 20 tons of slimes have accumulated in the settling tanks, the plugs are raised and the contents discharged by gravity into a 12-ft. Hendryx agitator. Charging the agitator with 20 tons slimes and 30 tons solution occupies about 7 minutes.

The Hendryx Process

Cyanide is added to bring up the strength of the solution to 0.05 per cent. KCy; an application of the Hendryx process then follows, which consists of filtering the solution during agitation and pumping to precipitation tanks, whence it flows back to the agitator. Within the agitator, suitably arranged, are 12 filtering cells, each cell consistly of a wooden frame 5x4 ft. by 2 in. and covered with canvas. The cells are connected by ¾-in. iron pipes and with the suction of a belt-driven triplex pump.

During agitation the gold values pass rapidly into solution, thus permitting the solution to be drawn through the filtering cells and pumped to the precipitation tanks at the rate of 3½ to 4 tons per hour. From the precipitation-tank sump, a solution, barren in gold, is admitted at the same rate to the agitator. The bulk of the solution in the agitator remains constant, and consequently the assay value of the solution gradually diminishes.

The physical character of the Reliance ore is such that a cake or coating about 6 in. thick forms on the filtering cells in about 2 hours. At the end of every 2 hours the cakes are "blown," i.e., broken up by reversal of the valves when the accumulations fall to the bottom of the agitator, and pumping is resumed.

During the early trials of the process some trouble was experienced at this stage of the operations. The cakes were so tough that when settled they did not break up, but choked the agitator. This difficulty was overcome by the introduction of water in jets projected upward from the bottom of the agitator. At the time of blowing, this water is admitted for a few minutes and rapid disintegration of the cakes results. After 12 hours' agitation, the contents of the agitator are discharged into a decanting tank and allowed to settle.

The clear solution is drawn from the top of the tank to a sump tank by means of a floating hose. From the sump tank the solutions are lifted by a centrifugal pump to the precipitation tanks. These are two decanting tanks, each having the capacity of an agitator charge, which allows 24 hours for the settlement of each charge, during which time clear solution is being drawn from the top. Tailing containing not less than 50 per cent. moisture is discharged from the decanters to the waste bank. During the discharge of the agitator the cakes are held on the filtering cells and vacuum is not cut until the agitator is empty, when the cakes are discharged directly to the waste bank.

The Hendryx process as applied at the Reliance mill has yielded good results. Apart from dissolving gold and silver the essential aim of the process may be said to be the reduction of decantation losses. The extent of these losses is governed by the value of the solution in precious metal when it leaves the agitator. The poorer the solution, the less will be the loss, since the tails, when discharged to the waste bank, carry with them a certain amount of this solution. An ideal state of things would of course be obtained were it possible to dissolve all the gold and recover it during the time of agitation, in which case, after agitation, we should have left barren tails and barren solution, i.e., barren in gold content. The only loss then incurred by decantation is in cyanide, which is a very small item with the weak solutions used in agitation.

The rate at which solution is filtered and precipitated will govern the assay value of the solution at the time of discharge of the agitator.

Rate of Filtration

The possible rate of filtration is dependent: first, to a certain extent, upon the capacity of the vacuum pump, and second, to a greater extent, upon the filtration area. Regardless of the capacity of the pump, only so much solution will filter through a given canvas area subjected to a given vacuum. Consequently, a point will be reached, when with any given filtering area no increase in pump capacity will yield a greater flow.

The filtering area is necessarily limited in an agitator, since sufficient space must be allowed between any two cells to permit the cakes to fall when blown. The more slimy an ore, the thicker the cakes will form; consequently the farther apart must the cells be placed and the smaller the possible filtering area. With the Reliance ore it is not possible to place cells

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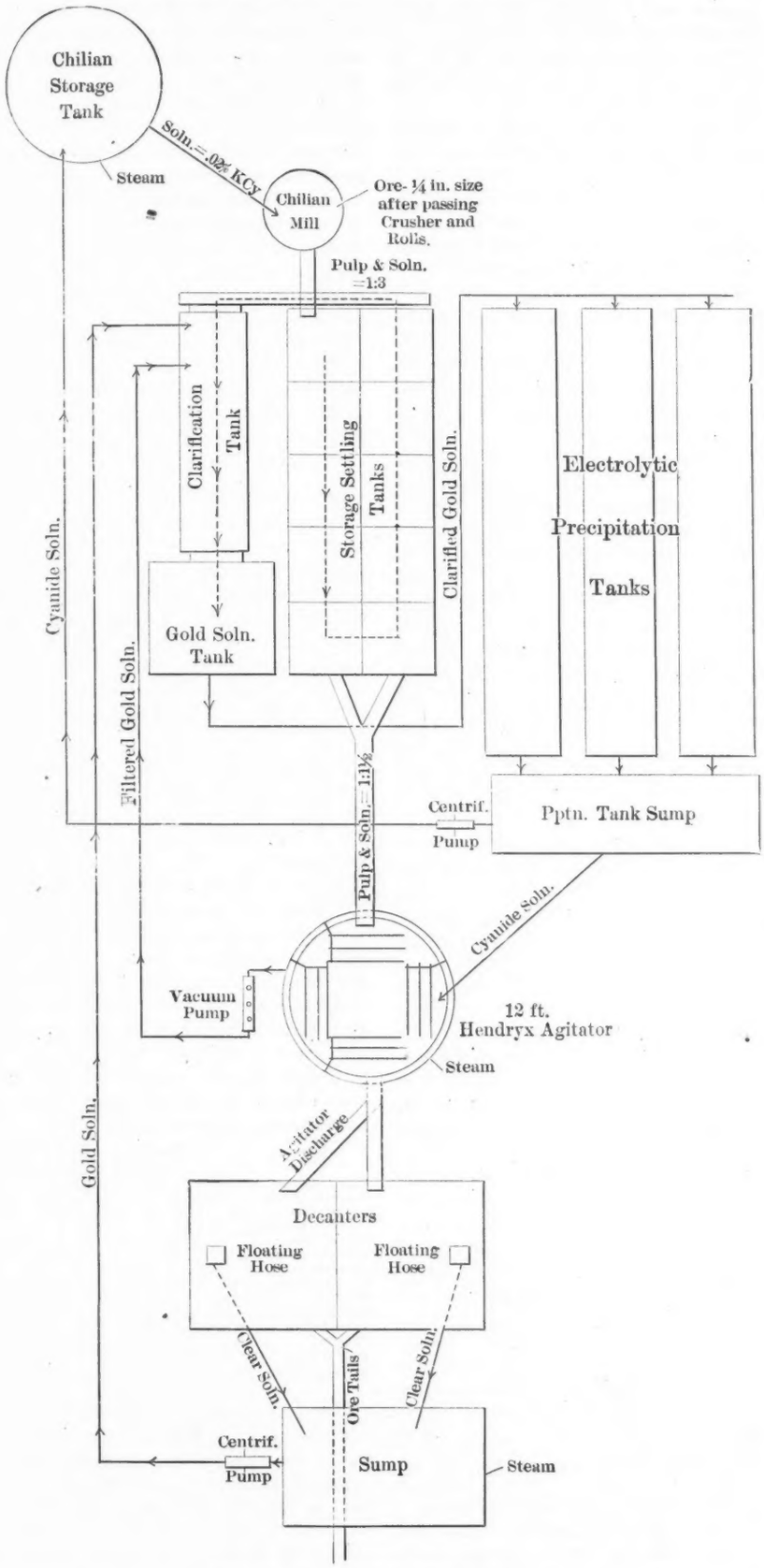
Note—The system here described was in use until the Reliance mill ceased operations, several months ago.

*Metallurgical chemist, Silverton, B. C.

closer than 18 in. from cell to cell. This gives a filtering area of 480 square feet.

PRECIPITATION

Maintaining a vacuum of 20 in., the solution is pumped to the precipitation tanks at the rate of 4 tons per hour. With a sandy ore, of course, this rate might be very much increased.



FLOW SHEET, RELIANCE MILL, NELSON, B. C.

The rate of precipitation will depend upon the adequacy of the precipitation facilities. It is absolutely essential that, whether electrical or zinc boxes are employed, they should be of such capacity that after one passage the solutions will flow back to the agitator carrying not more than a few cents per ton in precious-metal.

The longer the period of agitation, the longer the time afforded for the reduction in values of the solution.

The solution is heated in the agitator by a steam coil. Steam is also applied directly to the sump below the decanting tanks and in the Chilean mill storage tank. It is worthy of note that during the winter months the heating of the solutions renders the heating of the mill buildings in any other way unnecessary.

EVOLUTION OF THE METHOD

From this description it is evident that no amalgamation is employed at the Reliance mill. Preliminary tests on the ore have shown that about 40 to 50 per cent. of the gold is the so-called "free-milling" form, and when the plant was first operated, amalgamation was tried, but for various reasons it was subsequently abandoned. In the first place, no such recovery of free-milling gold as that indicated by the preliminary tests resulted. The gold ore was in such an extremely fine state of division that it dissolved almost immediately on coming in contact with the cyanide solution in the Chilean mill. In the second place, galvanic action between the Chilean mill mortar on the one hand and the amalgamated plates on the other took place, the cyanide solution being the exciting liquid, which resulted in the amalgamated plates becoming extremely hard, and passing somewhat rapidly into solution.

EXTRACTION

An extraction of about 85 per cent. of the gold is obtained by the treatment, about 40 per cent. passing into solution above the agitator, and the remainder during agitation. The consumption of cyanide, sodium cyanide being used, is about ¾ lb. per ton of ore treated, while the consumption of lime is 4 lb. per ton of ore. The mill is operated throughout by water power, the supply of water being ample for that purpose. The pressure is about 200 lb. per sq.in. at the nozzles of the Pelton wheels.

The present plant has a capacity of 50 tons per 24 hours, the agitator being charged twice daily. The operating costs, including labor, assaying, chemicals, lubricants, fuel for heating purposes and cost of marketing bullion, but exclusive of cost of management, amount to 65c. per ton.

According to the *Clay Worker*, March, 1907, 30 tons of magnesite brick per day are manufactured in the Transvaal from local deposits.

The Composition and Analysis of Zinc-lead Pigment

By Evans W. Buskett*

Zinc-lead pigment has generally been handled by the trade and by chemists as if it were a mixture of lead sulphate and zinc oxide. It is a chemical compound, a weak one, it is true, but nevertheless a chemical compound. The lead is present as a basic sulphate, and lead oxide; the zinc, as zinc oxide, and zinc sulphate. There is also a combination between the zinc oxide and the lead oxide, which is probably a zinc plumbate.

These facts can be readily proved by the following experiments: Mix in the proportions in which they are found in the pigment chemically pure zinc oxide, lead oxide and lead sulphate. Mix some of this compound with turpentine and place the mixture on a glass plate. It will have a decidedly red color. Place the remainder of the mixture in a crucible and heat to redness. When cool mix some of this compound with turpentine and place on the glass plate beside the first test. It will be more nearly white than the first. Mix a small quantity of lead oxide with a large proportion of lead sulphate, about 5 per cent. lead oxide and 95 per cent. lead sulphate. Put this through the same process, testing before and after heating. It will be found that although the color of the mixture is lighter after heating, there are specks of lead oxide, showing that all of the lead did not combine.

Mix about 5 per cent. of lead oxide and 95 per cent. zinc oxide and test in the same manner. The mixture will be decidedly lighter in color after heating, proving that there is a combination between the zinc oxide and the lead oxide.

These experiments must be performed carefully, for if the tests are heated to a temperature above redness, or are heated too long, they will be spoiled and no results will be obtained.

Sulphur dioxide is present in this pigment as a gas and probably also in the form of zinc sulphite and lead sulphite. In the process of manufacture zinc sulphate and sulphur dioxide are the compounds to be avoided. To do this both the bag room and furnace temperatures must be watched closely.

Method of Analysis

The assay of the pigment for sulphur dioxide, although a simple operation, is the most important determination in the laboratory of a zinc-lead pigment smelter, for the limit is 0.07 per cent. It is the custom to assay samples from the bag room at least once a day for sulphur dioxide, and the packout is assayed daily for zinc oxide, zinc sulphate, lead oxide, lead sulphate, sulphur dioxide and water.

The methods of assaying here described have been in use for some time and while not extremely accurate, they serve the purpose well. Results generally figure out within one-half of 1 per cent.

These methods of analyzing are in use in the laboratory of the Ozark Smelting and Mining Company:

Total zinc—Weigh 1 gram of pigment into a No. 3 beaker; add a little water and stir to make an emulsion. Add 15 c.c. of hydrochloric acid and stir until all the pigment is dissolved. Dilute to 200 c.c. with hot water and titrate with a standard solution of potassium ferrocyanide.

Zinc as sulphate—Weigh 10 grams of pigment into a No. 3 beaker and add 200 c.c. of hot water and boil for 5 minutes. Filter, wash out the beaker and allow the solution to drain through the filter, but do not wash. To the filtrate add 15 c.c. of hydrochloric acid and 10 c.c. of a standard solution of zinc, 1 c.c. of which equals 1 per cent. Titrate with a standard solution of potassium ferrocyanide, subtract the zinc added and divide by 10.

If the strength of the ferrocyanide solution is 1, and it took 12.2 c.c. to precipitate the zinc, then, $12.2 - 10 = 2.2$, and $2.2 \div 10 = 0.22$ per cent. zinc as sulphate.

Lead sulphate and lead oxide—The lead as sulphate and the lead as oxide are determined in the same portion of ore. Weigh 1 gram of pigment in a No. 2 beaker and add 50 c.c. of a 30 per cent. solution of acetic acid. Boil for 5 minutes, filter into a No. 3 beaker, allow to drain, but do not wash. Remove the filter from the funnel, open and wash the contents into the No. 2 beaker and add 25 c.c. ammonium acetate solution. (This solution is made by mixing one part of stronger ammonia with two parts 30 per cent. acetic acid. It should be acid.)

Place both beakers on the stove and boil. Rub down the sides of the No. 2 beaker and wash. Titrate with a standard solution of ammonium molybdate. This represents the lead as sulphate. Now to the completed assay add the filtrate and titrate again. The additional amount of solution represents the lead as oxide.

The strength of the ammonium molybdate solution being 1 per cent., and the first titration requiring 23.4 c.c., and the second, 36 c.c, then the lead present as sulphate is 23.4 per cent.; lead as oxide, 3.6 per cent.; and the total lead, 27 per cent.

Sulphur dioxide—The sulphur dioxide is determined by titrating with a solution of iodine. To make this solution, weigh into a No. 2 beaker, 0.397 gram resublimed iodine, add about 1 gram potassium iodide and 5 c.c. of water. Stir until dissolved. Each c.c. of this solution represents 0.0001 gram sulphur dioxide.

Weigh 1 gram of pigment into a No. 2 beaker, and add 100 c.c. of hot water and 5 c.c. of hydrochloric acid. To this add about 10 c.c. starch solution made by grinding in a mortar one gram wheat starch and 10 c.c. of cold water, and adding 100 c.c. boiling water. This solution should be made fresh every day.

Titrate until the blue color is permanent. The number of c.c. will give the per cent. of sulphur dioxide in hundredths. Suppose the burette read 6.4 c.c., then the sulphur dioxide would be 0.064 per cent.

Water is determined by weighing 10 grams of the pigment into a casserole and drying at about 110 deg. for one hour. It is then reweighed and the loss in weight divided by 10. Suppose the second weighing to be 9.955 grams; then, $10 - 9.995 = 0.045$, and $0.045 \div 10 = 0.0045$ gram or 0.45 per cent.

We now have the following data: Total zinc, 48.97 per cent.; zinc as oxide $48.97 - 0.22 = 48.75$ per cent.; lead as oxide, 3.60 per cent.; lead as sulphate, 23.40 per cent.; sulphur dioxide, 0.064 per cent.; water, 0.45 per cent.

Composition of Pigment

From the atomic and molecular weights of zinc, zinc oxide, lead, lead oxide, lead sulphate and sulphur dioxide the following composition is derived: Zinc oxide, 60.75 per cent.; zinc sulphate, 0.61; lead oxide, 3.87; lead sulphate, 34.25; sulphur dioxide, 0.064; water, 0.45 per cent.

*Metallurgical engineer, Joplin, Mo.

Wages in Belgium

Consul-General H. W. Diederich, of Antwerp, reports on the rate of wages in Belgium. He gives some figures which are of interest in comparison with American conditions. The cheapness of labor in Belgium is the most important factor in making the industries of that country successful in competition with the world.

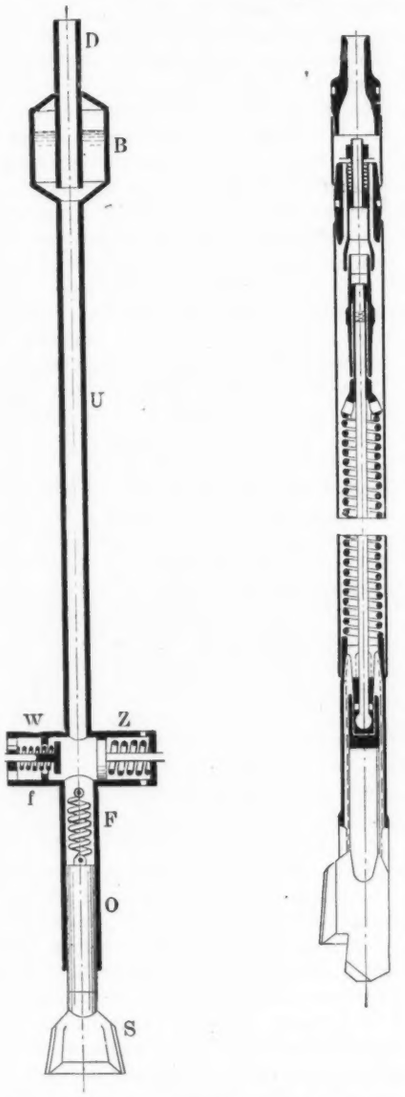
As an attempt to protect the laborer and establish something approaching a reasonable rate of wages, the town councils of Antwerp, Ghent, and Liège have authorized a minimum rate per hour to be paid to persons engaged by these municipalities in the various trades, of which 14 are shown in the following table:

Trade.	Antwerp. Cents.	Ghent. Cents.	Liège. Cents.
Blacksmiths	11	8	..
Boilermakers	..	7	9
Carpenters	9	8	8
Cement workers	..	..	..
Electricians	..	8	10
Glassworkers	..	..	8
Glaziers	9	7	..
Locksmiths	8	..	9
Masons	9	8	8
Painters	9	7	7
Plumbers	9	8	8
Printers	9	7	..
Roofers	9	7	8
Stonecutters	8½	..	8

The average price of Mesabi bessemer iron ores at Lake Erie ports in 1906 was $4 per ton. Expenses charged against this averaged as follows: Mining, 80c.; rail haul to shipping port, 80c.; lake freight, 75c.; taxes, 5.5c.; interest, 2c.; royalty, 26c.; total, $2.685. This leaves a balance of $1.315 per ton.

Hydraulic-ram Boring Apparatus

E. Frieh and R. Nöllenburg, of Nordhausen, have developed a method of boring at great depths, employing the hydraulic-ram principle. Instead of one falling block, they used a great number of single, common strikers (Fig. 1) which, being fastened in a slowly rotating case *G* (Fig. 3) and properly driven, perform the boring. The bottom is cleaned continually by rinsing. The rinsing water, conducted



FIGS. 1 AND 2. SCHEMATIC ARRANGEMENT OF APPARATUS

through the hollow poles *H* (Fig. 3) flows through the kettle-like case *G*, along the bottom, and rises up the walls of the shaft. The narrowness of the cross-section at this point, caused by the presence of the incasement *G*, necessitates a proportionate increase in the rapidity of the water flow, and thus intensifies the rinsing. In consequence of the enlargement of the cross-section, the larger particles of the sediment accumulate in a sediment box *S*, fixed above the case.

Advantages

The advantages of this new arrangement are said to be as follows: great safety of working, secured by the immobility of the poles; the possibility of increasing the mechanical effect of the striking apparatus; increasing the boring effect, and the application of efficacious rinsing, which hitherto was ineffectual in the other systems.

For driving the striking apparatus, the patent admits of the use of electricity, gas, compressed air, and pressing-water, but a closer examination shows the hydraulic motion of the single borers to be the only real practicable one.

The difficulty of constructing a powerful hydraulic motor for quickly succeeding blows lies, aside from the narrow dimensions of the bore-hole, the presence of sand in the water, and the arduous conditions of working, which exclude complicated constructions, in the nature of the force-transmitting medium, being heavy and almost incompressible. Every stoppage and every change in the direction of motion is necessarily followed by a more or less heavy shock of water in the pipes and in the motor, and this phenomenon, increasing in force with the rapidity of the motion, limits both the rapidity (therefore also the force) of the chisel stroke and the number of strokes which are possible with an ordinary hydraulic motor to about 150 or 200 per minute.

Ram Principle

In the boring ram under review an effective as well as a simple solution of the problem of hydraulic boring has been accomplished, making it possible to deliver with any desirable force 600, 1000 and more blows per minute. Since it is impossible to do away with the hydraulic shock, this has been turned to use. The boring ram is founded on the same principle as the familiar hydraulic ram used for raising water: the impact of a column of water stopped suddenly in its motion by the instantaneous closing of a vaive which was previously open. Thus the pressure exercised by a pump does not act directly upon the chisel, but serves only to accelerate the motion of the column of water, which does not strike until the proper moment arrives, and then transmits its kinetic energy by elastic impact to the chisel.

Fig. 1 shows the arrangement of the apparatus. The water flows through the conduit pipe *D* and the air vessel *B* into the stroke tube *U*. At the end of this tube the conduit branches out. One of the outlets is closed by an automatic valve *W*, kept open by the spring *f*, the second by the piston and the buffer-spring *Z*, the third by the piston *O*, which serves at the same time as stem for the chisel *S*. A powerful spring *F* tends to keep stem and chisel uplifted.

The strong springs press with their upper part (by means of a short piece of tube) against the piston. It is sufficient therefore to screw off the bore-shoe, if we wish to draw out, examine and change any of the parts connected with the chisel, also the piston with its leather packing.

The screw-joints are conical, and the stroke tube, with thick walls composed of parts with conical screw-joints, has a total length of 10 to 20 meters.

When a stream of water is sent by the pump through the tubular poles, it will at

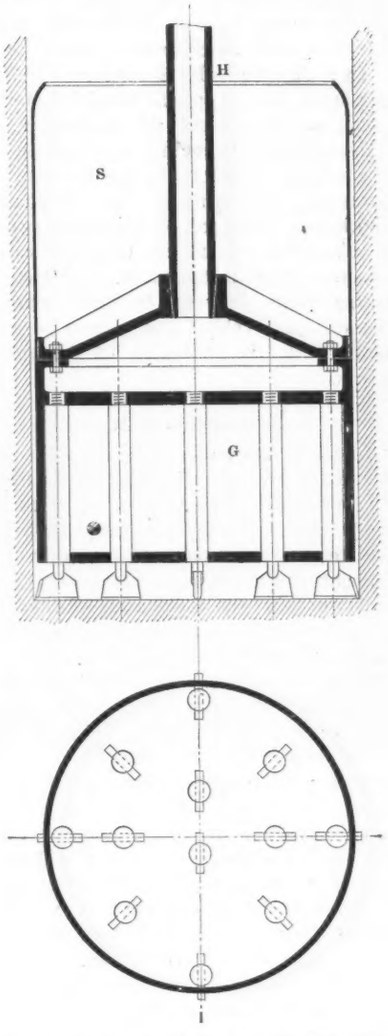


FIG. 3. ROTATING CASE AND HOLLOW POLES WHICH CONDUCT RINSING WATER

first rush out freely through the open valve *W*. But when the stream has attained a certain velocity, it will exercise such a pressure on the valve-plate from above, that the elastic resistance of the spring will be overcome and the plate will be thrown with great force on its seat. This is the moment when the hydraulic shock (or jar) takes place; the column of water in the tube *U* having been in motion and now stopped suddenly, strikes the piston *O* and throws it violently against

*Abstract from an article by W. Wolski, published by the German Deep-boring Company, Nordhausen.

the bottom of the bore-hole. At the same time the buffer *Z* is compressed by the sudden increase of pressure. But when the kinetic energy of the column of water is exhausted by the work done, the reaction follows. The buffer *Z*, again expanding, throws back the column of water in *U*, whereby the pressure of the pump is neutralized for a moment in its effect on the valve. The spring takes advantage of this moment to tear off the valve-plate from its seat, thus reopening the outlet for the water, and the column *U* repeats the accelerated downward motion. At the same time the chisel, after having delivered the blow at the bottom, is raised by the spring *F* until the moment when the next water-shock drives it down.

In reality the buffer *Z* appears to be superfluous, for the specific elasticity of the water acts in its stead; the shutting of the valve causes a temporary compression of the column of water, by the increase of pressure accompanying the hydraulic shock, and afterward, by expanding again, a subsequent rebounding from the valve occurs. The instantaneous rarefaction taking place between the two masses thrown apart (chisel and column of water) effects the reopening of the valve each time.

Deep-boring Ram

In designing a deep-boring apparatus by aid of the principle of the hydraulic ram, its construction must be accommodated to the narrow dimensions of the bore-hole, with length unlimited. The water must flow out in the center, as near as possible to the bottom; the chisel must be easy to change; the whole apparatus must be solid, simple and easy to take to pieces.

These requirements are fulfilled by the construction shown in Fig. 2. The valve-seat is cylindrical, with a central bore and a row of parallel holes around it. These holes are, all together, shut (or opened) by a thin, elastic, steel-plate ring, the valve-plate, playing above them. The valve-spring works in a cylindric, widened groove of the valve-seat. Its effect can be strengthened or weakened at will by putting under it plate-steel rings of various thicknesses. A short central tube serves as a guide for the valve-plate, and two removable nuts on it form its upper stop.

When the valve is open the water flows through the row of holes, through the mantle-tube, and the bore-shoe to the chisel, rinses the chisel and the bottom, and rises in the bore-hole as rinsing water. When the valve is shut, the pressure of the water-shock spreads itself through the valve-guiding tube into the working cylinder, a tube of chilled steel, in which the piston is playing.

The chisel, constructed in this case as an eccentric step-chisel, is joined to the long piston rod, from which it is suspended by a ball and socket joint, to prevent it from shaking. Its cylindrical part is guided exactly by four ledges in the interior of the cast-steel bore-shoe. Its flat part plays in a slit of the bore-shoe; thus the motion of transposing is communicated from the poles to the chisel.

Shaft-boring Ram

Since the boring ram is the only hitherto known hydraulic striking apparatus suitable for working the group arrangement of shaft-boring apparatus, this hydraulic motion has been adopted for the construction of the new shaft-boring apparatus.

Fig. 4 represents such an apparatus in the form exhibited at the Liege Exhibition by the German Deep-boring Company, of Nordhausen.

The bore-hole, of 1.70 m. dia., is commanded by six chisels. The instruments which work on the periphery are inclined

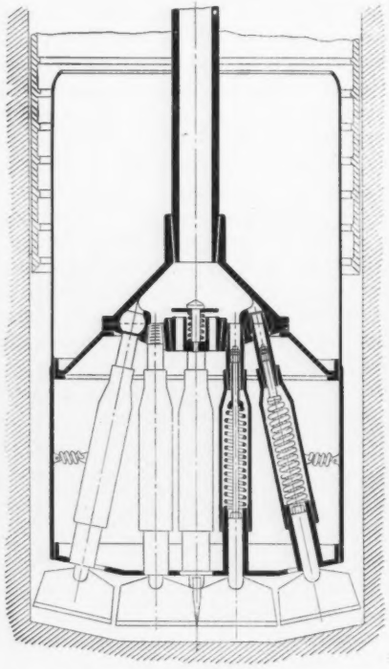


FIG. 4. CUTTERS IN POSITION, SHOWING CONSTRUCTION

somewhat toward the outside, thus neutralizing the detrimental consequences of the wear and tear of the border chisels, and, on the contrary, giving to the apparatus the tendency of boring out a shaft of rather exaggerated width. If the border apparatus is placed on hinges, as shown, there is obtained a very effective enlargement of the walls in order to sink the shaft timbering.

Every chisel has its own back-lifting spring and its own piston. But the air-vessel, the striking tube and the valve are common to all instruments. The common hydraulic shock is distributed by channels to all working cylinders.

The greater the dimensions of the shaft to be bored, the greater must be the number of the single instruments used. They must be distributed in such a way, of course, as to give approximately equal shares of stone, to be bored out, to every edge.

The same principle, of a number of chisels worked by a common hydraulic shock, can be applied to the construction of a shaft-widening borer with laterally acting edges.

A New Cobalt District

Prof. Willet G. Miller, provincial geologist of Ontario, has made an inspection of the Montreal river district, including the new camp at Elk lake and the deposits north of Lady Evelyn lake, the latter lying in the Temagami forest reserve. His report largely confirms the statements made from time to time as regards the mining possibilities of the district. The area is roughly defined as lying approximately 25 miles west of Cobalt and extending from about 6 miles north of Lady Evelyn lake northward to Elk lake, which is a long, narrow expansion of the Montreal river. The discoveries examined by Professor Miller are not so wide as those which made Cobalt famous, but the conditions are very similar. The deposits carry cobalt bloom and smaltite, with native silver and other minerals. The deposits north of Lady Evelyn lake have so far been found in the diabase, and the prospectors find encouragement in the fact that several of the later rich discoveries in Cobalt have been in the same formation.

At Elk lake a good deal of development work has been done and the rush is increasing daily. Professor Miller regards these discoveries as confirmatory of the opinion expressed in his first report on Cobalt, and based on the similarity of geological conditions at Cobalt to those of the Port Arthur district, 500 miles distant, that deposits would be found to occur in the intervening district. There is a water route by the Montreal river, and when navigation opens steamers will run from Latchford. There are three navigable water stretches between that point and Elk lake, on each of which boats will be placed, transhipment being required at two portages. On the second stretch of water course is a branch leading to Lady Evelyn lake, where a steamer is ready to run. The Timiskaming & Northern Ontario Railway is building a branch to Charlton, 18 miles from Elk lake, and if circumstances justify it this will be extended to the new camp. Another water route reaches Lady Evelyn lake from Temagami station, upon which steamboats may run.

The Pan Russian Gold and Platinum Congress, which met at St. Petersburg, Feb. 27, passed a resolution asking the Government to prolong by 10 years until 1919) the duty free admission into Russia of foreign machinery for use on the Ural and Siberian gold fields.

Mining in the Wonder District, Nevada

The First Claim in the District Was Located in April, 1906. Now There Are Four Towns and a Number of Producing Mines

BY EDWARD R. ZALINSKI*

Wonder, the new silver-gold camp in southwest Nevada, lies 18 miles northeast of Fairview. The stage leaves Fairview at 7:30 in the morning, and arrives in Wonder at about 11 o'clock. The fare is $5 going and $3 for the return trip. The road leads northeast and passes Chalk mountain about 6 miles from town. Some silver-lead prospects which have long been known, and which were recently sold, are located on the east side of the mountain. Ore from here in the Comstock days, was hauled to Virginia City and there treated.

The road is up-grade through a small cañon, with andesite flows on each side. About 1½ miles from Wonder the road to Hercules branches to the left, and Wonder mountain can be seen in the distance.

Location

The town is located on nearly level ground in a sheltered position between the main range on the east and Wonder mountain on the north. It is on the gentle slope which leads toward Hercules cañon, at an altitude of about 5700 ft.

The first claim location was made by J. L. Stroud in April, 1906, on what is now known as the Jack Pot group. The rush from Fairview began May 28, ground was taken up in all directions, and at the present time about 1200 claims have been recorded.

On May 30 the town site was located, and surveyed a few days later. The town as originally laid out was nine blocks long and four blocks wide, and every block on Main street was sold within a few days. The present price of business lots is from $300 to $600, and for residence lots from $150 to $300.

The town now has a population of over 400. It has a post office, four general stores, three restaurants, two assay offices, two surveyors' offices, a district recorder, and two notaries public, while numerous tents and rooming houses, a lumber yard, a barber shop, a corral, a drug store, saloons, etc., are on the ground. A telephone line connects with Fairview and Hazen, but there is at present no direct telegraph.

Water costs $5 per bbl., and is hauled from Horse creek about 6 miles to the northwest. A pipe line from Bench creek 6½ miles away, has been surveyed, and trenches for about 3 miles have been dug. There is a fall of more than 700 ft.

Freight Charges

All freight is hauled by teams from Hazen via Fairview at a cost of 2 to 2½c. per lb. From Fallon the rate is 2c. per lb. A new road is now being built from Fallon through Stillwater and Mountain Wells. It will be 45 miles to the Kingston townsite, and 50 miles to Wonder, and will save one day on the trip. This route is much easier than via Fairview. It is likely that this road will reduce the freight rates and give a quicker mail service.

Lumber in Fairview costs about $60 per 1000 ft. Delivered in Wonder it costs $72, while at Fallon, only 54 miles away, the price is $30 to $40. Planed lumber, 4x4 in., for claim posts, is worth $80 per 1000 ft. in Wonder. Mining supplies are about 30 per cent. higher than on the railroad, and water costs $5 per bbl. Miners' wages are $5 throughout the camp, and board and room can be obtained for $2.50 per day.

Location of Townsites

The Stevens townsite joins Wonder on the north, while other townsites have been laid out in the neighborhood of the mines. Hercules is 2 miles northwest of Wonder. Red Top is 3½ miles west, Victor 4 miles northwest, and Kingston is on the main Stillwater road, about ¾ mile north of Victor. The estimated population of the district Jan. 1 was: Wonder, 300; Hercules, 100; Kingston, 10; Victor, 25; total, 435.

MAIN STREET AND POST-OFFICE, WONDER

LA PLATA MOUNTAINS AND WASP CLAIMS, WONDER

Geology

The general geology of Wonder is similar to that of Fairview. The country rock is andesite, and there appear to be two generations, an older andesite, in which the ore was deposited, and a later intrusion which, in some cases, has cut off this ore. Here, as at Fairview, later rhyolite dikes have cut the andesite, and it is along these contacts with the rhyolite hanging wall that some of the most important orebodies have been developed.

Nothing has yet been done to show whether the rhyolite dikes are older than the second andesite or not. It is probable that fissuring and ore deposition accompanied the rhyolite intrusions, and

*Mining engineer, University Club, Salt Lake City, Utah.

that this was followed by the later andesite. The andesite on the south slope of Wonder mountain has inclosed in it numerous rough angular fragments of a dark shale. Shale in all probability underlies the andesite, and these fragments were brought up near the point of eruption. These shale fragments were also noted in various other portions of the district.

Mineralization

The main ore-bearing fissures strike nearly east and west and dip to the north. The magnetic variation at Wonder is 17 deg. 30 min. east. Directions here mentioned are magnetic north. The mineralized territory covers an area about 4 miles square and shipping ore has been opened in many places. On the western portion of the mineralized area the strike of principal mineral-bearing fissures is about north 80 to 85 deg. east, and on the east side it is a little north of west.

The chief value is in silver, with from one-fifth to one-eighth in gold. Silver sulphide and horn silver are the chief silver minerals. The sulphides often come directly on the outcrops. The gold is mostly free-milling in quartz veins, though values also occur along fissure zones in silicified andesite. Pyrite occurs, but it is not plentiful, and hematite and limonite frequently stain the ore.

Claims in the District

The Jack Pot was the first location in the district and was discovered in April. Active development began in August. The property comprises 165 acres and includes the Jack Pot, Hercules Nos. 2 and 3, Jack Rabbit, Hill Top, Lizard, Beauty and Worm claims, and the Grandview and Hill Top fractions, 2½ miles northwest of Wonder and about ½ mile northwest of Hercules. The development consists of a prospect shaft 4x7 ft. and about 50 ft. deep on the Jack Pot claim, sunk on a vein 2 ft. wide at the bottom. The ledge outcrops for 10 to 15 ft., with 1.5 to 2 ft. of good ore at the surface.

The vein does not cross the dike on the south side and no trace of it can be found north of the gulch. There is nothing to show the strike on the surface, as the outcrop is now covered by the dump. This dump will assay $20 to $40 to the ton. The ore is quartz carrying silver sulphide and horn silver. Sulphide occurs disseminated through the quartz, and the horn silver in scales along the cracks and seams. Some ruby silver occurs. The ore averages more than $200 per ton. From the development work, with a shaft only 35 ft. deep, more than 60 tons of ore was sacked, assaying more than $350. The ore is sorted and screened and the fines sacked separately. Drifting was begun in both directions at the 50-ft. level.

A drift northeast of the shaft cuts a vein striking north 45 deg. west and dipping 70 deg. northeast. This vein is 1 to 1.5 ft. wide and carries good values in white quartz. This is evidently a branch vein and joins the main vein at a point a short distance north of the shaft.

The Vulture Claims

Adjoining the Jack Pot on the west is the property of the Vulture Mining Company. It is located at the mouth of Jack Pot gulch, and claims are being worked on both sides. Ore is being sacked on the Grandview claim and also on the Extension. On the latter a ledge and vein on the ridge strikes north 80 deg. east, and the vein dips first south, and then to the north.

The veins are quartz, 1 to 3 ft. wide, in andesite, and run nearly parallel with the gulch. Andesite is often silicified along the vein, but in other places fresh and sharp to the edges of the vein. As a rule fissures and parting planes parallel to the veins occur. There is some chloride staining. Along the outcrop the quartz shows black grains of silver sulphide, and occasionally some horn silver. Three or more nearly parallel ledges occur and silver sulphide can be found along the strike over a distance of 300 to 400 ft. A tunnel is being driven east from the Hercules cañon to tap the veins at a depth of about 200 feet.

Nevada Wonder

This discovery was made May 28, 1906, and is the first of importance in the district. Six claims are included in the group. The Nevada Wonder, Nevada Wonder Nos. 1 and 2, Ruby, Ruby Nos. 1 and 2. The Nevada Wonder and Ruby take in Wonder mountain, and the summit of the ridge, while the other claims lie on the north and south side lines. The Hidden Treasure and Last Chance groups, join the Nevada Wonder on the northwest and southeast.

The first large transaction of the district was the sale of the Nevada Wonder for $300,000, by the original owners. The property was bought by J. B. Daniels for Philadelphia interests, and incorporated under the name of the Nevada Wonder Mining Company.

The development consists of a tunnel driven 110 ft. south and cuts the vein at a depth of about 60 ft. This is entirely in granular and altered rhyolite. The vein is about 4 ft. wide, and a winze is sunk 100 ft. on it, dipping to the north. The vein at this point will average $400 in gold and silver. The ledge here is soft and granular and contains free gold, silver sulphides, and horn silver.

Spider and Wasp Claims

This group is situated on the northern slope of the Wonder range, overlooking the Dixie valley, about four miles northwest of the town of Wonder and about ¾ of a mile south of the Kingston townsite. The claims are on the western part of the mineralized area as now known, and are reached by the new road from Fallon to Wonder by way of Stillwater and Kingston. The townsite of Victor is located

OPEN CUT ON THE GILKERSON LEASES, WONDER

VICTOR AND KINGSTON TOWNSITES, DIXIE VALLEY

north of the Wasp claim. The group consists of the Last Chance. Tonopah, Spider, Wasp, and Long Nell claims.

The apparent strike of the ledge from the outcrop is northwest, but the true strike is nearly east and west. The ledge dips to the north, and difference of elevation in the west and east ends causes a migration of the outcrop. The company's main tunnel is driven 40 ft. in the ledge near the discovery on the Wasp claim and cuts the ledge below the ridge cropping. Specimens show a silicified andesite and quartz gangue carrying silver sulphides and chlorides. Assays have run as high as $1200. The claims have been subdivided into 23 leases.

Leases at Wonder

Among the most prominent of these leases is the Toohey lease No. 13. This is situated at about the center of the Tonopah claim, on the highest part of the ridge west of main road. An open cut on the outcrop exposes a quartz vein 3 to 5 ft. wide with well defined foot and hanging. The strike is north 80 deg. east and the ledge dips 52 deg. north. The ore is similar to that of the Nevada Hills and Jack Pot claims, and from the open cut, approximately 10x8x6 ft., 10 to 12 tons of $200-ore were produced. A tunnel is being driven west of this open cut in a small gulch, and has cut the vein and ore at a depth of about 60 feet.

Gilkerson's leases Nos. 14 and 15 join the Toohey lease on the east. The altitude of the lease is 4700 ft., Wonder is 5700 ft. and Kingston 4300 ft. The shaft is 45 ft. east of Toohey's open cut and has exposed 3 ft. of ore.

Quartz ore 5 ft. below the surface assayed $182 per ton, gold and silver including 0.7 oz. gold. A sample of quartz taken 6 ft. below the surface across 5 ft. of ore parallel to the vein, assayed 4.42 oz. gold and 918.6 oz. silver. This was a picked sample but looked no better than much of the ore in sight.

There are other interesting properties both with and without development. The groups which I have named are typical of Wonder, and illustrate the known occurrence of ore in the district.

The Calumet & Arizona

This company owns a large copper property in the Bisbee district, in Arizona. Its report is for the year 1906. The capital stock authorized is 250,000 shares of $10 each; of which 200,000 have been issued. The financial statement shows cash and copper, $3,725,493; ore at smelter, $242,171; supplies at mine and smelter, $499,667; Warren stock, $25,500; accounts receivable, $431,996; total assets, $4,924,827. Accounts and bills payable were $258,694, leaving a surplus of $4,666,133.

The net earnings last year, after deducting all working and general expenses, were $4,827,873; from this there were paid dividends amounting to $2,600,000, leaving a balance of $2,227,873. Adding the surplus brought forward from previous year, $2,438,260, made a total of $4,666,133, as above.

The production statement is as follows:

	1905.	1906.	Changes.
Gold and silver, value	$178,843	$238,464	I. $59,621
Copper, lb.	32,77?,896	37,470,284	I. 4,697,388
Av. receipt per lb.	14.93c.	17.96c.	I. 4.03c.

The report says that the average number of men employed was 976; of these 587 were employed at the mine, and 389 at the smelter. Payments on options secured for the company, including a mine in Arizona now being unwatered for examination, will, if all the properties are purchased, aggregate $1,575,000. The payments can be spread over some time.

The total amount of development work during the year amounted to 14,818 ft. More ore has actually developed during 1906 than during any one year since the ore was first found on the property, and there is more ore actually in sight than at any time in the history of the property, with a large amount of favorable ground which development work has not reached at all. As much ore has been developed on the Irish Mag during the year as has been taken out. The development work has extended largely the limits of the known orebodies on the Senator claims, and two or three additional orebodies have been found on these claims.

The North Star Mines Company

This company owns a gold-mining property in Nevada county, California, which it has worked with profit for a number of years. Its latest report is for the year 1906. The capital stock is $2,500,000. The ore mined and milled during the year was 84,672 tons.

The revenue statement for the year may be given as follows:

	Amount	Per ton
Ore milled, 84,672 tons	$826,326	$9.76
Interest	19,181	0.23
Total receipts	$845,507	$9.99
Mining expenses	$240,256	$2.84
Milling, etc.	123,647	1.46
General expenses, taxes, etc.	28,542	0.34
Development and improvement	150,384	1.78
Miscellaneous	3,596	0.04
Total	$546,425	$6.46
Net earnings	$299,082	$3.53

From these net earnings dividends of $250,000, or 10 per cent., were paid, leaving a surplus of $49,082. Adding $545,795 brought forward from 1905, made a total surplus at the end of the year of $594,877; of which $454,914 was in cash, $119,689 in bills receivable, and $20,274 in supplies at mine.

In 22 years, 1884-1906, the mine has produced $7,447,940 from 487,763 tons of ore, an average of $15.33 per ton, and has paid $1,286,989 in dividends, besides paying $1,016,400 for development, $735,628 for improvements, new mills, etc., and $387,985 for additional property.

The report says: "The actually available profit realized during the past year has been derived wholly from the deeper workings, between the bottom of the old upper mine, and the 4000-ft level, operated through the central vertical shaft. During 1906 these workings produced 62,780 tons of ore, yielding $653,295, or an average of $10.40 per ton, at an operating cost of $263,213, or $4.19 per ton, and a resulting profit of $390,082, or an average of $6.21 per ton. Additional outlays for development work and prospecting, during the year, in the lower mine amounted to $75,768, or $1.21 per ton, making for operation and development together a cost per ton of $5.40, and leaving a realized profit of $5 per ton (little less than one-half the realized value) of the ore produced from the central shaft workings. The results of the past year again realize and confirm the expectations indicated in previous years, that, under present conditions of operating capacity and the now visible or probable ore supply, above the 4000 ft. level, we may long continue to produce ore yielding $9 to $10 per ton, of which one-third to one-half may be net profit, available for dividends.

"The outlays for development, during 1906, amounting altogether to $122,822, were made partly in the upper workings, as already noted, and partly in the lower North Star mine. The most important work in this direction has been the sinking of the main inclined shaft to the depth of 700 ft. below the 4000-ft. level, measured on the dip of the vein, beginning at the bottom of the central vertical shaft, at the 4000-ft. level, and following downward on the lode. A very good formation, regular in course and dip, has been found all the way, showing a large, well-defined vein of low-grade, but apparently profitable, milling ore. Stations have been made at the 4400 and 4700 levels and drifting is in progress, following the vein in both directions along its course, with favorable indications but not yet sufficiently extended to fully determine the value of the ore or the productive capacity of the ground. These workings will be continued both in length and greater depth during the current year, having constantly in view the deeper development of the mine to the limit of profitable operation, in the distant future.

"The outlays for improvements, $27,562, were mainly for the completion of the cyanide plant at the Central mill, besides other smaller items for the electric railway, new assay office, etc. The present conditions of the company's property and business are generally satisfactory and encouraging for the future."

The United Engineering Societies Building

The Structure Contains Offices, Libraries and Lecture Rooms for Use of American Societies of Mining, Mechanical and Electrical Engineers

A CARNEGIE GIFT TO ENGINEERS

The project of bringing together in one building, with proper facilities for offices, library, auditorium, meeting rooms, etc., the various engineering societies that make their headquarters in New York City had long been a topic of conversation among engineers, when Mr. Andrew Carnegie's attention was called to the fact that the Engineers' Club had just secured land for a new house in West Fortieth street, opposite the new Public Library. This was in February, 1903. The locality appealed to him as highly suitable, and on Feb. 14 he wrote a brief letter, saying:

"It will give me great pleasure to give, say, $1,000,000 to erect a suitable union building for you all, as the same may be needed."

One year later, when the plans and estimates showed that a larger sum would probably be required to carry out the work on an adequate basis, Mr. Carnegie in a further letter, addressed to the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, and the Engineers' Club, increased his sum to $1,500,000 in their joint behalf.

The only limitation to the gift was that it should be devoted to the erection of a building, the bodies interested buying the land. At the outset it was proposed to put up one building on Fortieth street, but it was finally decided to erect two separate buildings, one for the club on Fortieth street and one for the three professional societies on Thirty-ninth street.

The Holding Corporation

Each of the bodies named in the gift appointed three of its members to form a joint conference committee of twelve, whose duty it should be to accept the gift and erect the buildings, and that committee has remained in active existence up to the moment of the dedication of the Engineering Societies' Building. It comprised the following: American Society of Mechanical Engineers—C. W. Hunt, J. M. Dodge, F. R. Hutton; American Institute of Mining Engineers—A. R. Ledoux, C. Kirchoff, T. Dwight; American Institute of Electrical Engineers—C. F. Scott, C. W. Rice, T. C. Martin; Engineers' Club—W. H. Fletcher, J. C. Kafer, W. A. Redding. In organizing for its work this body made Mr. Scott chairman, Professor Hutton secretary and Mr. Kafer treasurer. Various changes occurred in the personnel of the committee from time to time.

One of the most important duties of the committee was the division of the gift in proportion to the requirements and objects of the two buildings. The delicate task was accomplished by allotting $1,050,000 to the Engineering Societies' buildings and $450,000 to the club building.

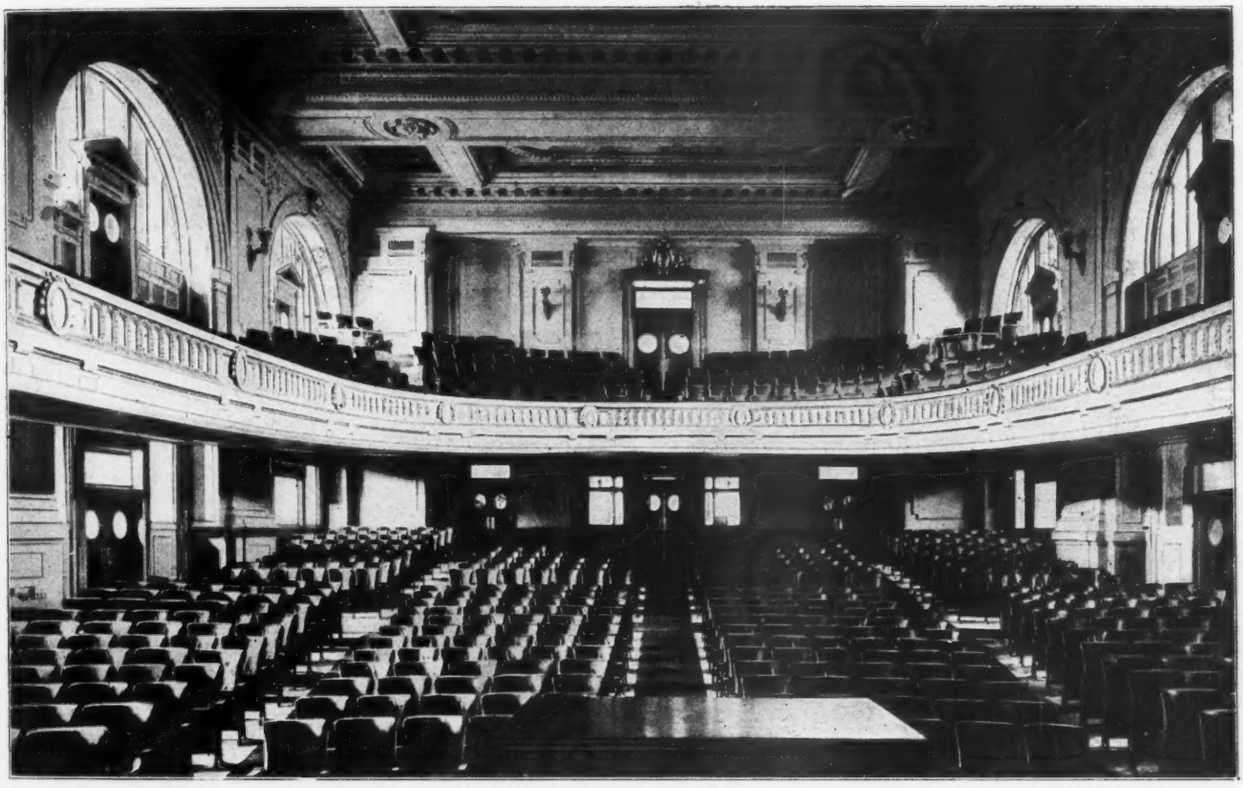
UNITED ENGINEERING SOCIETIES BUILDING

The site acquired for the Engineering Societies' building is on West Thirty-ninth street, north side, between Fifth and Sixth avenues. The frontage covers five city lots, the total front being 125 ft. This land has been bought with money advanced by Mr. Carnegie through R. A. Franks to the three engineering societies at 4 per cent. interest, the cost being $502,000, one-third of the amount being payable by each society.

Before undertaking the work connected with the building, it was found necessary to organize a holding corporation to administer the endowment and property for the founder societies jointly and in common. A corporation was formed by special charter in the State of New York, in May, 1904, called the United Engineering Society, to act as the trustee for the three founder societies, and its nine trustees are

chosen periodically three each by the councils of the electrical, mechanical and mining engineers, to control the building and regulate its finances. The title of the land rests also in this body corporate. The first president of the United Engineering Society was A. R. Ledoux, who was succeeded by the present incumbent of the office, E. E. Olcott.

The contract for the construction of the building was executed with Wells Brothers Company on July 17, 1905. The cornerstone of the building was laid in the eastern wall by Mrs. Andrew Carnegie, on May 8, 1906. The time of completion was fixed for November 15, 1906. Offices were ready for occupancy on Dec. 15, 1906; some were in use before the end of the year, and the entire building, though not quite finished, was ready for use Jan. 1, 1907.



THE AUDITORIUM FROM THE PLATFORM

The Building

The frontage of the building is 115 ft., and the depth is 90 ft. The building laws of the City of New York require that only 85 per cent. of the lot area shall be occupied by the structure on it. Advantage has been taken of this limitation to give the building a monumental appearance. It is designed in the French style and rises 13½ stories above the sidewalk to a hight of 218 ft. 6½ in. The exterior is built of limestone up to the auditorium floor, and of gray mottled brick and terra cotta above; the whole having a cheerful cream tint on all four sides. As the lower portion is devoted to auditoriums, the middle section to offices, and the upper part to the library, an effort has been made to accentuate these three separate parts of the building. There are 46 concrete piers in the foundation going down to solid rock. Two of these piers sustain a load of 3,000,000 lb. each, and the steel columns at these two points weigh 1000 lb. to the foot. The steel plate girders in the ceilings of the main auditorium weigh 48 tons each, and the steel lattice truss on the sixth floor weighs 64 tons. The total weight of steel employed in building construction is 2650 tons.

Access to the building is gained by the central entrance on the street level to the first floor, by the western side door leading to the elevators, and by the broad driveway which encircles it completely. There are three elevator riseways in the main elevator shaft, faced with an iron grill lined with wire glass. On each side of this shaft wide stairways rise to the sixth floor of the building, and one leads thence to the library floor. At the first floor, a rear door communicates across the ten-foot areaway, in the open, with the café of the club-house, and on the ninth floor, a flying covered bridge connects with the breakfast room on the tenth floor of the club.

The Interior

The first floor is laid with Tennessee marble tile, having a border in design of colored marble. The central court or main foyer is marked by twelve large columns of Swiss Cipolin marble. A short low flight of steps leads from the foyer to the elevators, and at will a metal grille is thrown across the steps so as to restrict or direct travel. Gold ornament is used sparingly for architectural accentuation, and the wood work is in dark oak. Large chairs and lounges in red leather furnish the foyer, and similar furniture is used in the writing room, smoking room, reception room and administration room, which also contains three telephone booths associated with the "private exchange" system. On the foyer walls, facing toward the main entrance, are two large bronze tablets, one bearing a relief portrait of Mr. Carnegie and the words of his second terse letter of gift of $1,500,000, and the other a statement to the effect that the land was given by members and friends of the three founder societies.

Immediately above the first floor is the coat room, laid out on a sectional plan so that several lines of persons may be accommodated at once on entering or leaving.

The main auditorium extends up through two floors, and with its gallery will seat about 1000 persons. The requirements of this chamber were unusual and difficult of definition. It had to be arranged primarily for the general meeting of the societies, at which the speaking is from the floor as well as from the platform, and at which diagrams, illustrations or blackboard drawings are often

employed. This is quite the opposite from the ordinary audience hall, where the stage is the starting point both for the seating arrangements and for the acoustic and optical necessities. Hence the platform is notably small for so large a hall, accommodating few persons, while any speaker in the audience is easily within range of observation by everybody.

On both the parterre and the gallery floors, at the sides, the auditorium is surrounded by corridors, rendering access to every point easy, and permitting ready withdrawal for conversation, committees, etc. The corridors assist also in maintaining quiet within the hall. There is also a stereopticon equipped with connections for moving pictures.

The next two floors above the main auditorium are devoted entirely to lecture rooms, of which there are seven. Two assembly rooms occupy the larger part of the fifth floor in such a manner that they can be used independently, or one may be made auxiliary to the other. Two smaller rooms on this floor can be also used separately or as annexes for reception or conversational purposes, and provision is made with steam tables, etc., for the service necessary for luncheons or light refreshments. All these rooms are agreeably finished in soft light tints and have facilities for water, air, electric connections, etc., for demonstrations and experiments.

The sixth floor is also divided into lecture rooms, planned somewhat differently, and of smaller dimensions than those on the floor below.

Offices of the Societies

The seventh and eighth floors of the building have been reserved for the associate societies that have engineering or some department of science as their principal object. For these organizations the building affords office areas of varying size, from one room up, with the common facilities of the lecture rooms, library, and other accessories. Among these societies may be enumerated the Society of Naval Architects and Marine Engineers, the Society of Heating and Ventilating Engineers, the National Electric Light Association, the Society of Chemical Engineers, the New York Electrical Society, the Association of Edison Illuminating companies, the American Street and Interurban Railway Asociation.

Each of the three founder societies occupies a floor laid out in accordance with its own plans. The American Institute of Mining Engineers has the ninth floor, the American Institute of Electrical Engineers has the tenth floor, and the American Society of Mechanical Engineers has the eleventh floor. These floors are all devoted to administrative and executive work, and the libraries of the three societies have been concentrated in the two top floors of the building.

A crowning detail in the plan of the building has been the reservation of the twelfth and thirteenth floors for the libraries of the three founder societies and of such other collections of engineering literature as may be added. The twelfth floor, below the library proper has been devoted to the book stacks, but at the present time the main library is also equipped with one tier of stacks, with provision for a gallery tier later. The founder societies entertain the ambition of creating and maintaining the finest collection of engineering literature in the world, supplemented by the current periodicals, and all the patents relating to invention in the arts and sciences. Provision is being made for special research accommodation, working alcoves, photographic reproduction, drawing and similar library work. Commanding magnificent views of Greater New York and vicinity in every direction, the library is retired, quiet, free from noise and dust, an ideal haunt of the student and man of research; while open at all times to any reader. In view of the proximity of the new public library, the Engineering Societies Building, with its unequalled collection of scientific and industrial data becomes at once a vital and important center of the highest value for the diffusion of useful knowledge.

The Library

Alloys of 50 per cent. iron, nickel or manganese with 50 per cent. aluminum have been found to disintegrate after a comparatively short time, says *Brass World*, March, 1907, but if the mixture is not half and half this does not occur.

Dedication of the Engineering Societies Building

Exercises dedicating the building presented to the engineering societies by Andrew Carnegie were held in the auditorium of the building, Tuesday, April 16, at 3 p.m. Charles W. Hunt, past president of the American Society of Mechanical Engineers, presided. Rev. Edward Everett Hale led in prayer. Communications from President Roosevelt, President Diaz, of Mexico, and the Governor General of Canada, were read, and a letter from Charles H. Haswell, the veteran engineer, now 97 years of age, expressed his regret at not being able to attend the meeting.

Charles F. Scott reviewed the history of the building, from the conception of the idea to its final completion.

E. E. Olcott, as president of the United Engineering Society, and representative of the founder societies, formally accepted the building, and received the key from the chairman.

Andrew Carnegie, the donor of the funds which made the building a possibility, received an ovation, all present rising from their seats to greet him as he arose to speak. Mr. Carnegie spoke of the pleasure it gave him to make such a structure possible. He pointed out the advantage enjoyed by American engineers, above all others, in having the ability and the inclination to coöperate. He said that this was the keynote of universal brotherhood, and the aim of the peace congress, in session in another building in the city.

President Arthur T. Hadley, of Yale University, closed with an address on "The Professional Ideals of the Twentieth Century." "It is not the works that men do," he said, "but the men that do them that really count, and the best way to honor one's deeds is to provide that one's children shall do still greater deeds. The engineering professions are becoming more universally recognized, and are taking their proper place in the world. This building would have been impossible in the eighteenth century for then only the arts and theology were honored."

In the evening a reception by the societies committee was held in the auditorium and each of the founder societies received in their respective rooms. Refreshments were served in the large rooms on the fifth floor. The number present at the reception is variously estimated to have been between 1000 and 2000 persons, among whom were many mining engineers.

The regular sessions of the meeting of the A. I. M. E. were held in the new building, the dedicatory exercises being preliminary to the New York 1907 meeting of that association.

Tennessee Copper Company

The report of the Tennessee Copper Company at Copperhill, Tenn., for the calender year 1906, states that development at the company's three mines consisted of 36 ft. of shaft sinking, 787 ft. of drifts and crosscuts, 224 ft. of raises and winzes and 4613 ft. of diamond drilling.

The total ore extracted was 363,741 tons, of which 362,900 tons were smelted, producing 11,319,591 lb. fine copper in bessemer pig which was equivalent to 31.19 lb. per ton of ore smelted. Sales of copper realized $1,739,446.

Operating costs, based on the treatment of 362,900 tons of ore were as follows:

	Ore Per Ton	Copper Per lb.
Mines development	$0.1067	0.343c.
Mining, hoisting, etc.	0.7817	2.512c.
Crushing and sorting	0.0693	0.227c.
Railway	0.1389	0.438c.
Blast furnace	1.4864	4.765c.
Engineering and laboratory	0.0370	0.118c.
General	0.1387	0.445c.
Converting	0.2733	0.876c.
	$3.0320	9.724c.
Adjustment of ore account	0.0013	0.004c.
Cost of fine copper in pig	$3.0307	9.720c.
Freight, insurance and selling		0.68
Taxes and all other expenses		0.51
Total cost per lb copper		10.91

The profit for the year after deducting $106,000 for depreciation of plants was $824,231. The sum of $516,360 was spent for new construction, consisting of sulphuric-acid plant ($192,295), enlargement of smelter ($200,000), and the balance for dwelling and other houses and for equipping a quartz quarry.

The charge smelted for the year consisted of:

Ore	362,900	tons.
Converter slag	23,260	"
Blast furnace by-products	25,897	"
Custom ore	5,862	"
Quartz flux	68,421	"
Limestone flux	493	"
First matte and custom	97,914	"
Total	584,747	"
Coke used	32,720	"

An average of 1277 workmen was employed at the Tennessee plant.

The Broken Hill Proprietary Company, Ltd.

In the report of the Broken Hill Proprietary Company, Ltd., of New South Wales, for the half-year ending Nov. 30, 1906, the statements are given in great detail and are condensed as follows: Gross profits, £345,622; depreciation on plants, £31,337; net profit for half-year, £314,285. £22,387 was expended for construction of light and power plants.

The assets, consisting of cash, bullion and other convertible stocks, amount to £614,682, including reserve and insurance funds. Two dividends of 1s. 6d., and two bonuses of 1s. per share, amounting to £240,000, were distributed during the half-year. The profit for the same period showed an increase of £81,952 over that of the preceding six months, and the profit per ton of ore increased from £1 0s. 2d. to £1 1s. 1d.

The spelter plant was completed, but numerous modifications have since been made.

The refinery treated 1135 tons of bullion per week, resulting in 28,409 tons of soft lead, 283 tons antimonial lead, 911 oz. gold, and 1,964,977 oz. fine silver.

The zinc plant treated 400,112 tons of tailings, producing 109,468 tons of concentrate.

The total quantity of ore smelted in the furnaces was 93,471 tons. Five roasters treated 51,984 tons of material, including 45,154 tons converted by the Huntington-Heberlein process. During the half-year 5381 tons of concentrate from the mine were handled direct at the smelters without roasting.

The various departments of the plant report favorable progress through the period under review.

North American Mines Exhibition

An exhibition of mines and minerals was opened at the Grand Central Palace, Monday, April 15, which is to last two weeks. The exhibit, under the auspices of the North American Mines Exhibition Company, consists of ores from Nevada, California, and other mining districts, but few of the well known producing mines are represented, with the exception of some of the Cobalt properties. In this section some interesting samples of mass silver and vein matter are shown. Mining machinery and appliances are not much shown, and the visitor gets little insight into mining and milling methods.

Stock brokerage houses are well represented and quotations are recorded on a large board. The prospective purchaser can be accommodated if he desires to buy stock in one of several hundred stocks quoted. An assay office occupies one of the sections, and accurate assays of ores are made "while you wait."

In the center of the hall a panoramic representation of the Nevada gold fields, from the discovery to the present day, is shown.

Umpire Analyses

H. Fresenius (*Zeit fur anal. Chem.* XLV, 103) in regard to the differences between chemists, suggests that the interested chemists and umpire should exchange samples and continue analyses even after the business side has been settled. Thus the cause of variations may often be found with a consequent advantage to analysts in general.

Colliery Notes, Observations and Comments

Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

DEVELOPMENT AND MANAGEMENT

The average cost per mule per day in a mine is about $1.20 or 15c. per hour for an 8-hour day.

There are 400 square miles of anthracite coal measures in the central part of Rhode Island and eastern part of Massachusetts. The fuel is of highly metamorphosed varieties or graphite coal. It requires a high temperature under a heavy draft to burn it, and was worked as early as 1808, however, the mines were never on a paying basis.

The Lehigh Coal and Navigation Company has started a system of gravity tunnels to drain mine water, in the Panther Creek valley. The main tunnel and the drainage gangways call for 78,000 ft. of gangways—a total of nearly 14 miles. The estimated cost is about $700,000. It has been figured that after the completion of the drainage tunnel the saving by this means alone will be about $150,000 per year.

The mine operators in the Schuylkill region are alarmed about the spread of tuberculosis among the mules, the estimated value of which in that territory is more than a quarter of a million dollars. The disease has made considerable headway among the animals lately. The owners have appealed to the State for aid in fighting the infection. It is said that the mules have contracted the disease from cows which have been slaughtered in that section of the State by the authorities during the last three or four years.

The head sheaves most generally used in the coalfields have cast-iron rims and hubs and wrought-iron spokes. They are lighter and stronger than those made of cast iron entirely. The diameter of a head sheave depends on the size of rope, load to be lifted and the length of rope. For a 1½-in. rope the diameter should be at least 7 ft. 6 in. The groove in the sheave should be lined with wood so that the wear on the rope may be reduced to a minimum. The spokes should be staggered in the hub.

In mining coal measures separated by a stratum less than 50 ft. it is the practice in the anthracite field to use the "chamber-over-chamber" system, that is, the pillars in the lower vein should be left directly under the pillars in the upper vein; sometimes it is customary to leave every tenth room untouched so as to leave a reserved pillar for further protection from caves and squeezes. When ready for drawing the pillars it has been the practice to commence robbing the upper vein first; it is, however, much better to use the "pillar-over-pillar" system of robbing.

All self-acting planes should be provided with an angle of inertia at the head, that is, an inclination having a greater grade at the top than the plane itself; so that the trip will start with a momentum, which, in turn, will start the empty trip up the plane. The reverse should be the case at the bottom of the plane, so that when the loaded trip reaches the foot, the speed will be retarded by the decreased grade. For an engine plane, the engine may be located at the head or foot, and the grade of the plane should be uniform from top to bottom.

The success of a coal mine depends largely upon an efficient underground haulage system, regardless of whether the roads are inclined or level. It has been found by practice that the minimum grade for a slope or plane is 5 per cent. when the length is not over 600 ft., so that three loaded cars descending from the head of the plane will pull up three empties. When the length of the plane is more than 600 ft. and less than 2500 ft. the grade should be increased by 1 per cent. for every 300 ft. over 600 ft. That is, a 900-ft. plane should have at least a 6 per cent. grade.

It has been found in practice that the speed of flow in the main compressed air line should not exceed 30 ft. per second. If the velocity exceeds 30 ft., the plant is not running on an economical basis, and the percentage loss will increase with the increase of the velocity. From 4 to 6-in. main lines are sufficient for ordinary practice in mines; a 4-in. line will deliver 480 cu.ft. of free air per minute, compressed to 85 lb., with a loss of 2 to 3 lb. for a line less than 3000 ft. This volume of air is sufficient to run four 3-in. drills. The line may be of cast or wrought iron. Wrought-iron pipes are usually connected by sleeve couplings. An inspection of the main should be made now and then and if the pipe leaks, it must be repaired at once as an air leak is more expensive than a steam leak.

In preparing anthracite coal in the breaker the lump coal is first crushed by rollers. The manner of feeding the rollers is very important, depending entirely on their diameter and revolutions per minute. For example: If the diameter of the rollers is 30 in., and r.p.m., 120, then the speed of the crushing surfaces of the rollers is nearly 15.8 ft. per second. Now, in order to obtain the maximum percentage of prepared sizes, the coal when it touches the rollers, should have a velocity of 15.8 ft. per sec. In order for the coal to attain this speed by the time it comes in contact with the rollers, it must fall through a space of 4 ft. from rest. The lump of coal will be broken unnecessarily if its speed is greater or less than 15.8 ft. per second, provided that the revolutions per minute of the rollers remain the same.

Tests have been made recently at the Trotter plant of the H. C. Frick Coke Company of a new miners' lamp. It has been patented by H. H. Huttle, of New Jersey. The inventor claims that it is safe in any mine of gaseous nature. At the Trotter mine, 50 lamps were put on trial. The lamp weighs 5¼ lb., and is not intended to hook on the miner's cap. It has a large metal hook which is designed to catch on the mine wall or rib, and the heavy glass sighted toward the face where the miner is working. By two sockets the lamps are charged from a 110-volt dynamo, which is located in a separate room, especially provided for keeping lamps after every working day. The charge in the lamp will last for eight hours, while the cost of each lamp is about $15. The results of various tests show that the apparatus is safe in gassy mines.

It has been found by practice that in burning small sizes of anthracite, the ashes produced when a steam jet system is used contain more unconsumed carbon than when produced by the fan-blast method; in the latter system, the rate of combustion per square foot per hour is greater than with the steam jet. It was found that, when a bed of coal was ignited and burned out without disturbance, the percentage of carbon in the ashes was much less than when coal was successively added to the burning bed. In practice, however, it is impossible to burn out sufficiently before adding fresh coal. The introduction of steam into the ash pit naturally decreases the tendency of the fuel to clinker on the grate in comparison with the fan-blast or natural draft. The higher percentage of carbon in the ash is due to the fact that when the fuel gets red hot, it acts almost like dry sand and works its way into the ash pit. Although the fan-blast produces the best ash and gives a more rapid rate of combustion of the fuel, yet, in some cases it is more advantageous to use the steam jet on account of the clinkering. The combustion of the fuel is more perfect when the coal is undisturbed while burning.

Metallics

The black coloration of blende is not necessarily an indication of high content in combined iron; for example, some of the blende of Wisconsin is black, but is low in combined iron. Blendes which are black in color and of brilliant luster are apt to be high in combined iron, but not always.

Raises should whenever practicable be started from an off-set from the drift. There is always quite a little loose rock, etc., falling down a raise, which litters up the track when the raise is started without an off-set. A floor should always be laid at the bottom of a man-way, so that this dirt can be quickly and easily cleaned up.

Liquid carbon dioxide resembles liquid cyanogen in possessing only a small solvent power, and, in this respect, differs sharply from liquefied sulphur dioxide and ammonia, which are good solvents for inorganic salts, and from liquefied hydrochloric, hydrobromic and hydriodic acids, and hydrogen sulphide, in which many organic substances are easily soluble.

Many experienced drill sharpeners gage the bits by eye only. All drill sharpeners, no matter how expert, should be made to use a gage in sharpening the steel. There is nothing more aggravating than wasting time in a hunt for a drill to follow one with a small bit. Many foremen are extremely careless in regard to the steel which they furnish to their miners.

At some convenient place in a stope where square-set timbering is used, an ample place should be provided for storing a good supply of wedges, blocks, and planks for flooring. Much time is lost by men hunting for blocks, wedges, etc. There is no better time to put in a floor in square-set mining than to lag with planks the set as soon as it is put in. The planks should therefore be kept in some handy place.

Most miners are inclined to drop tools where they use them last. A timber truck is used to run in timbers, lagging or what not. Instead of being returned to the station, it is left where last used. A jack-screw may be used to jack back some drift-post after the lagging has been eased. Instead of being returned to the storehouse or to the station, its proper place, it is left where last used. Much time is idled away in hunting for mislaid tools. All such haphazard work increases the expense of mining.

Rock drills driven by air are necessary in mining operations and will remain so probably for years to come. For hard rock-boring there is no machine so universally used, and consequently, as it is improbable that they can quickly be displaced by other classes of borers, every attention should be given to studying means of improving the present methods connected with their use. This is the more important inasmuch as in the utilization of power at the drill bit, the rock-drill is one of the most inefficient of common machines.

The presence of tin in certain samples of zinc ore from the Slocan, British Columbia, is noteworthy, although it is not greatly to be marveled at, in view of the close association of the veins of the Slocan with granitic rocks, which are especially kindly to the formation of tin minerals. Traces of tin occur in the base bullion (lead) produced at the Trail smeltery, B. C., and it is to be remarked that galena ores from the Slocan, obtained from the same veins as the zinc ore are extensively smelted at that works. The occurrence of tin in zinc ore is unusual, but not extraordinary. Crystals of cassiterite have been isolated in the blende mined at Freiberg, Saxony, and spelter produced there has shown an appreciable percentage of tin, while tin has been detected in some of the old brands of spelter made in New Jersey.

The zinc smelters of Holland, Belgium, and the west of Germany receive their ore supplies through the ports of Hamburg, Rotterdam and Antwerp, but chiefly through Antwerp. These smelters have been for many years dependent upon foreign mines for nearly their entire supply of raw material. The system of receiving these supplies has therefore become well organized through long experience. This organization has made Antwerp the favorite port of entry. There are at that port convenient docks for unloading and trans-shipping the ores; agencies for the sampling of the ores as received; brokerage houses for the consummation of transactions in custom lots; and public assay offices for the determinative work that may be required. Antwerp is, moreover, conveniently situated with respect to the principal smelters of Holland, Belgium and the Rhine, has excellent railway connections, and also is the terminus of an extensive canal system, by which cheap transportation to the works can be secured.

A big proportion of the cost of mining at most mines is that of tramming. Especially is this so when men are used to "mule." This is frequently due to poor tracks. Drifts should be kept scrupulously clean. A good employment for an old or a crippled miner is in keeping drifts clean and ditches clear of débris. Wrecks on the main line are expensive underground as well as above ground; besides, the cleaner the track, the more a trammer can run. It is cheaper in the long run to use a 16-lb. rail than a 12-lb. rail; generally too light a rail is used underground. A grade frequently used in laying tracks is from ½ to ¾ in. per rod. Most upsets in tramming occur at turn-sheets. Therefore turn-sheets should be avoided, if possible. When they are used, the drift for at least 5 ft. on each side of the turn-sheet should have a good plank floor. This allows the "wreck" to be easily and quickly cleaned up. When no such floor is laid, the trammer, being in a hurry, shovels only what he has to and tries to "lose" the rest. As a result the drift is left very dirty and another wreck is unavoidable.

Many a foreman has given the following advice to some young miner that he liked: "Keep your place neat and your tools picked up. It makes the work easier for you and—we don't expect so much work from such a miner." Miners are notorious for the slovenly condition in which they keep their working places. A foreman should insist upon a reasonable exercise of orderliness, for it is quite as easy to keep tools in order as to scatter them everywhere. In square-set mining this is easily accomplished by requiring the men to keep such articles as tamping sticks, scrapers, etc., lying upon nails driven into the cap or tie. Axes should be hung from two nails driven into the post. The saw should be hung up; it remains sharp longer. Valves of machines, where machine drills are used, should be hung upon a nail when not in use. In short, everything that can be reasonably cared for in that way should have its nail and should be kept there. As the miners work ahead the nails can either be driven into the posts or, better still, drawn by means of a spike-puller, which is a very handy tool to have in a stope. The spike-puller is only a bent piece of hard steel with a split at the end to catch the nail.

The zinc smelters of the United States are divided into two groups, viz. (1) those which make high-grade spelter from special ores, this group including the New Jersey Zinc Company, and the Bertha Mineral Company, producing at Bethlehem and Palmerton, Penn., and Pulaski, Va., spelter from the remarkably pure ore of New Jersey; and (2) those which make spelter from Western ores. The Western spelter up to about 1901 was made almost entirely from ore mined in Wisconsin and the Joplin district of Missouri-Kansas, and was marketed chiefly under the name of "prime Western." Certain smelters, purchasing selected ores, made superior brands. Since 1901, the quantity of ore from west of the Rocky mountains has attained large proportions, and the "prime Western spelter" now produced is largely derived from that class of ore. Many of the smelters separate the first draw of metal, which, being distilled at the lowest temperature of the operation, is lower in certain impurities (especially lead) than the second and third draws, and market it as "special." The major part of the Western spelter is produced, however, as ordinary brands, and the prices for ore are based on the prices of good ordinary brands of spelter.

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Illustrated.

Production of Copper in the United States in 1906

The production of copper in the United States in 1906 was 917,620,000 lb. In our preliminary statistics, published Jan. 5, 1907, we reported 915,000,000 lb. Our final figures differ from the preliminary by less than 0.3 per cent. They show an increase over 1905 of only 4.8 per cent. The details of the production, in comparison with the figures for 1904 and 1905, are given in the following table:

PRODUCTION OF COPPER IN THE UNITED STATES

(In pounds)

State.	1904.	1905.	1906.
Alaska	2,043,586	4,703,600	8,700,000
Arizona.....	191,602,958	222,866,024	263,200,000
California.....	29,974,154	16,697,489	24,421,000
Colorado.....	9,401,913	9,854,176	9,565,000
Idaho.....	5,422,007	6,500,000	9,493,000
Michigan.....	208,329,248	218,999,753	224,071,000
Montana.....	298,314,804	319,179,885	299,850,000
New Mexico.....	5,368,666	5,638,842	6,262,000
South and East.	15,211,086	14,907,982	18,821,000
Utah.....	47,062,889	51,950,789	49,712,000
Wyoming.....	3,565,629	2,393,201	146,000
Other States....	1,418,065	1,550,000	(a)3,379,000
Total.....	817,715,005	875,541,741	917,620,000

(a) This figure includes 400,000 lb. of copper produced in the form of bluestone, and also considerable copper which belongs not to "other States," but to those above enumerated, to which, however, it cannot be accurately allocated.

Our statistics are based on reports of the copper content of blister copper, except that a comparatively small part of the total production, which could not be conveniently reported in that way, was reported as refined copper, allocated according to the States of origin. This introduces a little disuniformity into the statistics, but such discrepancies as there may be on that account are immaterial. In view of the incorporation of this refined copper in the total, instead of the copper content of blister, from which it was derived, the copper in by-product sulphate corresponding with it, has been included in the grand total. The Michigan production, of course, is reported entirely as refined copper.

The computation of the production of copper on the basis of the copper content of blister produced gives the production in the nearest practicable way to its origin, and permits a classification among the States of origin with a degree of accuracy that no other method of collecting the statistics affords. However, even on this basis, it is impossible to make an absolutely accurate allocation. The blister copper basis is not the proper one upon which to reckon consumption, because this copper is several months in transit and process of refining before it is put in final marketable form, and the time is variable. Thus, in 1906, the time of transit was longer than ordinarily, because of the congestion in railway traffic during the latter portion of the year. Moreover, the fine copper content of the blister copper produced does not represent exactly what finally is delivered in marketable form, because there is a loss in refining, which on the grand total of so large an output as the American amounts to a considerable figure. We have not made any allowance for such loss, because it has not been done in previous years, and it has been considered desirable to leave the statistics for 1906 in a form directly comparable with those for 1905.

The reasons for the changes in the production of the various States have been discussed in previous articles, so that it is unnecessary to enter further into that subject at the present time. The only explanations that are required refer to the statistics for Alaska, Utah, and "Other States." Alaska did not produce so much copper in 1906 as is credited in the above table, but the smelters produced that quantity of copper from Alaska ore, a considerable part of which was mined in 1905. The decrease in the production of Utah, which is shown in the above table, is statistical rather than real. It is explainable by a more complete distribution of the product of the smelters in Utah than was made in the previous year. These smelters receive a great deal of ore from other States, especially California and Idaho. In 1905 those States received credit for less than their whole production, while Utah received credit for more. As a matter of fact, the copper production of Utah increased in 1906, but a considerable portion of its ore was not smelted, going into the stock of raw material of the Garfield Smelting Company, whose plant was put in operation during the year. Our statistics being based on blister copper production, the copper content of this material was not included. Approximately the same quantity will remain in stock so long as the smeltery is in operation, and when the latter ceases operation, its copper content will appear in the production for that year. Under the caption of "Other States," is included the production of Nevada, Washington, Oregon, South Dakota, and Texas, together with an allowance of 400,000 lb. of copper in by-product sulphate, for the reason explained above, and together with further quantities of copper which were actually produced, but could not possibly

be distributed according to the States of origin.

The above statistics are based on reports received from every producer in the United States, among which all duplications have been carefully eliminated. In entering the totals for the several States, the nearest thousand has been used, in order to have round figures in each case.

Production of Lead in 1906

The production of refined lead in 1906 was 415,656 short tons. This report is based upon returns received from all of the refiners, with the exception of one small concern, whose production is estimated on the basis of its known receipts of ore. In our issue of Jan. 5, 1907, we reported the total production as 412,042 tons, our final figure being a little less than 1 per cent. higher than the preliminary. The details of the production are given in the following table:

PRODUCTION OF LEAD IN THE UNITED STATES
(In tons of 2000 lb.)

Class.	1905.	1906.
Desilverized, domestic	205,665	220,095
Antimonial, domestic	8,456	7,434
Southeast Missouri	81,299	100,492
Southwest Missouri	21,324	16,528
Miscellaneous	3,000	980
Total, domestic	319,744	345,529
Desilverized, foreign	83,504	67,441
Antimonial, foreign	2,730	2,686
Total, foreign	86,234	70,127
Grand total	405,978	415,656
Total, antimonial	11,186	10,120
Total, soft	102,623	118,000
Total, desilverized	289,169	287,536

It is to be distinctly noted that the above statistics represent the production of refined lead. The lead-smelting industry is so complex that it is impossible to make an accurate distribution among the States. A fairly close separation can be made, however, between the lead of domestic origin and that of foreign origin, because the latter is dutiable. Even under that circumstance, however, the separation is not precise, because the Government assesses duty on only 90 per cent. of the work-lead and lead content of ore imported, allowing 10 per cent. for loss in smelting and refining; but the actual loss in those processes is not so large as that, wherefore the smelters and refiners make a certain gain on their imports, which they are able to market as domestic lead. The statistics reported above are accurate so far as they represent the quantity of lead actually produced in final marketable form. They include a small quantity of old lead which comes back to certain of the refiners for reconversion into refined lead.

As to the classification in the above table, it is to be further noted that it is to a large extent conventional. The quantities credited to Southeast and Southwest Missouri represent the lead actually smelted in those districts, not the ore production of the districts. The smelters of Southeast Missouri obtain considerable lead ore from the Joplin district, and also obtain small quantities from outside of Missouri. A considerable portion of the lead produced in the Southeast Missouri district (in which we include the two large smelters in Illinois, near St. Louis) is desilverized, which is done, however, rather to improve the quality of the lead than to extract the small quantity of silver, which it contains. The lead entered as "desilverized" in the above table is only the product of the high-grade argentiferous work-lead of the Far West.

Hydrographic Surveys and Mining

That the hydrographic division of the Geological Survey can and does perform an important service to the mining industry is shown by the contents of a bulletin, No. 196 of the series of water supply and irrigation papers, just issued, describing the work done on "Stream-flow in Alaska."

The work was confined to the Nome region of the Seward peninsula, and was undertaken in order to obtain information regarding the amount of water available for the development of placer mines and possible water power. Stream-flow data were collected at 45 stations, and the conditions affecting the water supply were carefully studied. Owing to the great value of the water for use on the gold-bearing gravel deposits, little attention was given the water power possibilities, but enough information was obtained to show the value of a number of sites which might be used with advantage.

Many promising placer projects have failed for the want of just such information as that made available in this bulletin. Accurate knowledge regarding the quantity of water which may be brought to bear upon a gravel deposit should obviously always be taken into account before beginning the construction of ditches and the purchase of machinery. These investigations of the Geological Survey reduce the amount of necessary preliminary work required of the placer engineer.

California Counties for Nevada

The residents of Inyo, Mono and Alpine counties wish to be separated from California, and to be joined to Nevada, and have petitioned their legislature to that effect. These counties lie in the mountainous region of eastern California opposite the southern end of Nevada, and the people are convinced that a fair share of the remarkable prosperity of that portion of the neighboring State would descend upon them if the border line were removed.

The petitioners claim that under the present conditions the promising mining properties in their territory are not receiving the attention that would come to them were they situated in Nevada, and that nature intended the counties in question to be a part of that State. The counties are remote from the business center of California, and the lines of travel to San Francisco and Sacramento lie through Nevada.

The natural configuration of the country, and the direction of the lines of travel are better reasons for seeking the change than the prosperity of Nevada's mines. The three discontented counties may some day get up a boom of their own in which Nevada will have no share.

THIS HAS BEEN A GREAT WEEK for the American Institute of Mining Engineers and especially for its distinguished member, Andrew Carnegie. The society has formally entered into possession of its beautiful and commodious quarters in the building erected for its use and that of the sister societies, and Mr. Carnegie has had the supreme satisfaction of taking part in the dedication of that building, his gift to the most practical and most scientific of all professions. Never has a like opportunity been offered and never has an opportunity been utilized more intelligently and more fully. As an example of engineering, the adaptation of means to an end, the building will serve as an object lesson for years to come, and as a center for the development and encouragement of the most advanced thought, it is likely to play its part in the achievements of the future.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

Readers Too Busy to Read, Should Clip

In the JOURNAL of March 2 there is an article on "Readers Who Will Not Read." Too few mining men realize the advantage and great value of clippings, systematically filed, on subjects relating to their particular line of work. It is a great aid to intelligent and profitable reading and keeps one abreast of the times.

A CONCENTRATED LIBRARY

I have been clipping for about four years, and I have found that it has been of greater value to me in many ways than I thought it would be. It makes in time one of the best possible reference libraries with the advantage that it can be kept up to date, by throwing out articles which time proves to be valueless, besides being very flexible and occupying a small space. It is of special interest since it contains a great diversity of opinion, and experiences from all quarters of the globe.

My clippings have not yet grown unwieldy, and I take them with me wherever I go, in my valise. They are good companions, for when I get hung up in some out of the way place, I take them out, and forget that I have no daily papers. For the average mining man, whose office is usually under his hat, clipping is just the thing, for he has no place for keeping complete files of periodicals where he can reach them when he needs them most.

It often happens that I have no time to read an article carefully at once, but I can always cut it out and file it later, if upon reading it proves to be something that I want. It is impossible for the average man to remember clearly what he reads on technical subjects, more especially if it happens to be something which at the moment he has no particular need of. This is another reason for clipping. Clipping tends to make a person careful in reading articles for he is always on the hunt, after he gets the habit, for new opinions and experiences, and at the same time he does not want to clip articles that are of doubtful or only momentary value. It teaches him to weigh each article carefully.

METHOD OF FILING

It has occurred to me that someone might get up a system of envelope filing which would help by its simplicity to interest more men in keeping clippings. I use ordinary, large legal envelopes, marking them "A1," "A2," "B1," "B2," as the case may be, with the subject written out below, as a heading. This is followed by a list of articles contained in the envelope, numbered 1, 2, 3, etc. Sometimes I also note some point in the article, together with its title, which I may particularly wish to remember.

Each clipping is marked with the envelope number followed by its own individual number. When a subject runs over into a second envelope this second one is marked with an additional letter, thus "A1a," the first clipping being "A1a-1." In the case of two articles on one clipping, it is filed under the more important head and correspondingly marked, while on the envelope covering the less important article, this article is duly noted as if contained in the envelope, and in addition "See A1-1," referring to the envelope and article number under which the clipping is actually filed.

I would not exchange my clippings for the value of the periodicals used during the four years. I can never tell when they are going to help me out. This idea of filing I owe to an article in the JOURNAL, which appeared about three years ago, and for which I have many times given thanks. G. B. LEVINGS.

Ahuatlan, Mexico, April 5, 1907.

Mine Explosions and Atmospheric Pressure

I read in the JOURNAL of March 2, an article dealing with the effect of low barometric pressure on mine gases. After reading this discussion, I secured some data with reference to some explosions in Alabama and asked the Weather Bureau observer, W. F. Lehman, of Birmingham, for the figures of barometric pressure and relative humidity of the atmosphere. I inclose his reply.

You will note that on Feb. 20, 1905, at 4 p.m. the barometric pressure in that vicinity was 30.21 in, and the relative humidity 100 per cent. On that date the explosion at the Virginia mine occurred, and proved to be the most disastrous mine accident in the history of Alabama.

In getting up your statistics on this matter allow me to suggest that you consider both the temperature and relative humidity of the air. In my opinion it will be found that most of these explosions have happened when the atmosphere was at or near its point of saturation.

J. M. GRAY.
Chief Mine Inspector.

Birmingham, Ala., Apr. 7, 1907.

Mr. J. M. Gray.

Dear sir: In answer to your letter of April 2, I send you the following extracts from the records kept at this office:

Feb. 12, 1902, was a fair and cool day. No records of the barometric pressure on that date are available at present, but the low temperature on it and the previous day shows conclusively that the pressure was considerably above the normal, and the preceding period of fair weather and prevailing northerly winds indicate general dry conditions for that date.

Jan. 8, 1903. Such records as are available for this date show that the day was fair, cool, and comparatively dry with the barometer reading about 30.08 in. in the late afternoon.

Feb. 26, 1904, 10 p.m.—Barometer 30 in.; relative humidity about 78 per cent.

Feb. 20, 1905, 4 p.m.—Barometer, 30.21 in.; relative humidity, 100 per cent.

Feb. 27, 1906, 4 p.m.—Barometer, 30.19 in.; relative humidity, about 45 per cent.

W. F. LEHMAN, Observer.

Birmingham, Ala., April 6, 1907.

After receiving the above letter from Chief Inspector Gray, we investigated the atmospheric conditions prevailing in Alabama previous to the time of the Virginia mine explosion. The results of this investigation, shown in the following figures, is in a way confirmatory of the connection between the Virginia explosion and the fall in barometric pressure. Although the explosion occurred at a period of comparatively high barometer, it happened nevertheless at the lowest point in the fluctuations. The readings were as follows:

Feb. 18, 1905, 8 a.m., 30.48; 8 p.m., 30.46
Feb. 19, 1905, 8 a.m., 30.46; 8 p.m., 30.38
Feb. 20, 1905, 8 a.m., 30.22
Feb. 20, 1905, 4 p.m., 30.21 (explosion)
Feb. 20, 1905, 8 p.m., 30.22
Feb. 21, 1905, 8 a.m., 30.24; 8 p.m., 30.25

Mine Explosions and Atmospheric Pressure

It has been proved that atmospheric influence is one of the important factors that enters into the conditions leading up to disastrous explosions in gaseous mines. The discussions along these lines in the JOURNAL in recent issues are very timely and deserve the thoughtful consideration of the mining fraternity.

There are several causes which might produce a mine explosion, such as a person neglecting to close a door after passing through it, the unexpected obstruction of an air course by a fall of roof or the tapping of a strong feeder of gas. An explosion from any of these causes is local in its effect, only one section or split being likely to suffer, but an explosion in which atmospheric conditions enter, is general in its effects and as a consequence the whole mine suffers.

In view of these facts, and that a drop in the reading of the barometer gives timely notice to the official in charge of a gaseous mine of approaching danger; or that there is to be given off an extra amount of gas, would it not be a good idea to have a barometer stationed at each mine in a convenient place, where the officials might take observations at any time, and a record of readings kept at the colliery?

I have in mind several instances at a gaseous mine where I found it necessary to withdraw the men at short notice on account of sudden atmospheric changes, being guided purely from observations of the weather and a careful watch over the air currents with a "Davey" lamp; but how much better would it be if an accurate barometer were stationed at our mines where the officials might take observations at any time.

A barometer is just as necessary to the officials of a gaseous mine as the thermometer is to a physician to determine the condition of the human body. Some of the European mining laws require a barometer at gaseous mines. Evidently this law is the result of careful research on the part of the leading mining men. They realized that it indicated danger, and that it was just as important as the "Red Light" is in railroading.

It is to be hoped that these discussions will continue and result in an agitation that will cause barometers to be placed at all mines.

L. M. EVANS.

Scranton, Penn., March 27.

The Use of Slag Blocks

In the JOURNAL of March 23 is an interesting article by Herbert Lang in which he proposes to cast slag into prismatic blocks and to use these blocks in the mines, adjacent to the smelting plant, in place of timbers.

Whether such blocks will be used or not will depend upon many factors which I shall not discuss here. For one thing, it is very probable that when the mine and the smelter are in juxtaposition, the ground is so rough that the slag can perhaps be more advantageously used for grading purposes, whereby more room is obtained for the various buildings required by the growth of the plant, as, for example, at Globe, Arizona, than for use in the mine. In such a case some other material, probably concrete, will in the future be used underground, especially in constructing stations.

Slag cast in various shapes has, for a long time, been used for construction purposes at the surface, for instance in Mansfeld, Germany. In Bisbee, Arizona, houses were constructed years ago of blocks of slag. When in Peru about three years ago, I noticed that at the Casa Palca smelter, in the Andes at about 1300 ft. altitude, on the Oroya railroad and between Lima and Cerro de Pasco, such blocks were used in constructing buildings. They were found to be a very satisfactory substitute for stone and timber.

Wood is extremely scarce at this place and dried llama dung is the fuel used by most of the people. At all times of day one can see a number of Indians congregated around the dumps cooking their food in the hot shells from the slag pots and in the hot pots themselves.

J. MORGAN CLEMENTS.

New York, April 13, 1907.

Zinc Smelters in the United States

Please give me the names of all the zinc smelters in the United States.

GEO. F. PEART.

Candela, Coahuila, Mexico, April 1, 1907.

The smelters now operating in the United States are the following: Grasselli Chemical Company, Cleveland, O., Clarksburg, W. Va.; Matthiessen & Hegeler Zinc Company, Lasalle, Ill.; Illinois Zinc Company, Peru, Ill.; Sandoval Zinc Company, Sandoval, Ill.; Mineral Point Zinc Company, Mineral Point, Wis.,[1] North Chicago, Ill., Depue, Ill.; Hegeler Bros., Danville, Ill.; Edgar Zinc Company, St. Louis, Mo., Cherryvale, Kan.; Lanyon Zinc Company, Iola, Kan. (3 works); United Zinc and Chemical Company, Iola, Kan.; Cockerill Zinc Company, Iola, Kan. (2 works), Altoona, Kan.; American Zinc, Lead and Smelting Company, Caney, Kan., Dearing, Kan.; Lanyon-Star Smelting Company, Bartlesville, I. T.; Pittsburg Zinc Company, Pittsburg, Kan.; Cockerill Zinc Company, Pittsburg, Kan., Nevada, Mo., Rich Hill, Mo.; Granby Mining and Smelting Company, Neodesha, Kan.; United States Zinc Company, Pueblo, Colo.; New Jersey Zinc Company, Bethlehem, Penn.[2], Palmerton, Penn.[2]; Bertha Mineral Company, Pulaski, Va.; Ozark Smelting and Mining Company, Joplin, Mo., Coffeyville, Kan.

[1]Produces zinc oxide.

[2]Produces both spelter and zinc oxide.

The *Mining Journal*, London, states that the dividends paid by the gold mining companies in Western Australia during 1906 amounted to £1,992,063, making a total of £15,974,880 to the end of the year.

The Assay of Silver Bullion by Volhard's Method

The general practice in using Volhard's method for the estimation of silver in silver bullion is to follow the principle of the Gay-Lussac method, by precipitating most of the silver with a measured quantity of normal solution, and then making successive additions of deci-normal solution until the reaction is completed. The end point is indicated by the red color of the ferric thiocyanate formed. E. A. Smith, Trans. I. M. M., Jan. 12, 1907, describes a modification of the Volhard method whereby the end point is determined with greater certainty and accuracy. His practice is to add sufficient ammonium thiocyanate to the check assay to intensify the red color of the ferric thiocyanate, and to use this color as a standard of comparison.

The normal ammonium thiocyanate is prepared of such strength that 100 c.c. is equivalent to about 1.0003 to 1.0005 grams of silver. To standardize the normal solution, 1 gram of pure silver is dissolved in 10 c.c. of dilute nitric acid (sp. gr. 1.2) in a 250-c.c. Gay-Lussac bottle and heated in a water bath until all traces of nitrous acid are expelled. The solution is then diluted with 50 c.c. of the indicator (50 c.c. contains 2 c.c. of a saturated solution of ferric alum decolorized with nitric acid) and 100 c.c. of normal thiocyanate added to it from a pipette. The bottle is then stoppered and well shaken for two minutes, and allowed to settle leaving a perfectly clear red colored solution. The addition of 0.5 c.c. deci-normal silver nitrate solution should render the solution colorless, if not, the normal solution should be so adjusted as to secure this result. The color obtained is used as a standard of comparison and all assays worked to it.

In assaying silver bullion, such an amount is taken as to contain about 1 gram of silver. The bullion is dissolved and treated like the proof. Then deci-normal thiocyanate is added drop by drop, with a thorough shaking after each addition, until the color corresponds exactly to that of the proof. The addition of 1 drop (0.05 c.c. equivalent to 0.05 mg. of silver) makes a perceptible difference in the color.

The comparison of the assays with the check is best made by placing the bottles on a shelf with a back of opal glass, and facing the direct light from a window. In some cases it is advisable to filter and then compare the solutions. When copper is present the strength of the normal thiocyanate should be increased, and an approximate amount of copper added to the proof to correspond to that present in the bullion. The usual volumetric precautions should be followed, and the bottles should be shaken at once after the addition of the normal thiocyanate.

New Publications

REPORT OF THE STATE GEOLOGIST, WYOMING. By Henry C. Beeler. Preliminary Report; Pp. 45: 6x9 in., paper. Cheyenne, 1906.

THE STEEL SQUARE AS A CALCULATING MACHINE. By Albert Fair. Pp. 81; illustrated, 5x7½ in.; cloth, 50c. New York, 1906: Industrial Publication Company.

RICHARDS' SYNOPSIS OF MINERAL CHARACTERS. A useful and handy little book, presented in a form which is very convenient to the traveler and the prospector.

LES RICHESSES MINERALES DE L'ALGERIE ET DE LA TUNISIE. By Paul F. Chaloñ. Pp. 99; illustrated, 5½x9 in.; paper; 4 fr. 50. Paris, 1907: H. Dunod et E. Pinat.

QUESTIONS AND ANSWERS FROM THE GAS ENGINE. Pp. 274; illustrated. 5x7 in.; cloth, $1.50. Cincinnati, O., 1907: Gas Engine Publishing Company.

Contents: Theory of design. Mechanical design. Marine design. Automobile questions. Producer gas questions. General questions. Trouble inquiries.

NEW ZEALAND. PAPERS AND REPORTS RELATING TO MINING, COMPRISING STATEMENT BY THE MINISTER OF MINES, REPORT ON THE GOLDFIELDS, REPORT ON COAL MINES, AND STATE COAL MINES. Pp. 243; illustrated, 8½x14 in.; board covers. Wellington. 1906: John Mackay, Government Printer.

JOURNAL OF THE IRON AND STEEL INSTITUTE, Vol. LXXI, Nos. III and IV, 1906. Containing the Minutes of Proceedings of the London Meeting, July, 1906, and Papers Presented. Edited by Bennet H. Brough, secretary. Two volumes. Pp. 1015; illustrated. 5½x8½ in.; cloth, $6 per volume. London, 1906: E. & F. N. Spon.

ANALYSES OF BRITISH COALS AND COKE AND THE CHARACTERISTICS OF THE CHIEF COAL SEAMS WORKED IN THE BRITISH ISLES, Compiled by A. Greenwell and J. V. Elsden, with an Introduction, "The Classification of Coals and the Interpretation of Analyses, by Clarence A. Scyler." Pp. 455; 1 map, 7½x9½ in.; cloth, 5s. London, 1907: The Chichester Press.

HANDBOOK OF METALLURGY. Vol. II. By Dr. Carl Schnabel. Translated by Prof. Henry Louis. Second Edition. Pp. 867; illustrated. 6x9 in.; cloth. 21s. London, 1907: Macmillan & Co., Ltd.

This is the second edition of the second volume of the translation by Professor Louis, of Doctor Schnabel's well known work, which has become one of the classics of metallurgical literature. It is no exaggeration to say that it is distinctly the best of the general metallurgies, because in fact there is no other of modern character. For this reason a revision which brings it up to date will be heartily welcomed. The second edition of the first volume, which treats of copper, lead, gold and silver, was published in 1905. The present volume treats of zinc, cadmium, mercury, bismuth, tin, antimony, arsenic, nickel, cobalt, and aluminum. It has been largely extended beyond the limits of the first edition, and has been made as modern as the editorial and mechanical restrictions permit a work of such magnitude to be.

TRANSACTIONS OF THE AMERICAN ELECTROCHEMICAL SOCIETY, VOLUME X. TENTH GENERAL MEETING, NEW YORK, OCTOBER 8 AND 9, 1906. Pp. 132; illustrated. 5½x9 in.; cloth. Philadelphia, 1906: American Electrochemical Society.

Contents. Proceedings of Tenth General meeting. Directory of members. Formula for the E. M. F. of a Helmholtz concentration cell, Henry S. Carhart. Visible Migration of particles between electrodes, Carl Hering. Some small laboratory appliances for electric fusion work, S. S. Sadtler. Copper cathodes in nitric acid, J. W. Turrentine. An aluminum and magnesium cell, G. H. Cole and H. T. Barnes. Melting points of some cryolite-alumina mixtures, F. R. Pyne. Some factors affecting distribution, H. E. Patten. Ultra-violet light in the laboratory and in practice, Charles Baskerville. Pyrometers, theoretically and practically considered, with remarks on the definition of temperatures, E. F. Roeber. A thermo-electric pyrometer for general industrial applications, F. F. Schuetz. The Heraeus "Le Chatelier Pyrometer," Richard Moldenke. Discussion on pyrometry, R. S. Whipple. Discussion on special forms of pyrometers, R. P. Brown. Communicated discussion descriptive of the Price pyrometer, Electric Dental Supply Company. The Decker primary battery, F. B. Crocker.

Coal Mining in Ohio During 1906*

BY GEO. HARRISON†

Although there was a cessation of work in the mining industry of three months, and in some districts exceeding that time, during the year 1906, due to a strike inaugurated by the United Mine Workers for a restoration of the 1903 scale, the coal tonnage of the State was not materially affected—in fact, there was an increased tonnage of 1,378,838 tons, the entire production of the State totaling 27,213,495 tons.

Increases in 18 counties amounted to 2,596,030 tons, and the losses in 11 counties, 1,217,192 tons. The total number of persons employed in the industry in both pick and machine mines was 46,501, an increase of 2308 persons.

The total pick tonnage was 6,500,263 tons, or 23.9 per cent. of the entire production of the State, produced by 9836 pick miners, 1988 inside day hands and 1304 outside day hands. Average time worked in pick mines was 176 days. The average production of lump coal produced by pick miners for the year was 451 tons per man, or 3 tons for each man per day.

The number of tons of machine-mined coal was 20,713,232 tons, or 76.1 per cent. of the entire production of the State, produced by 2895 runners, 20,905 drillers, loaders and shooters, and 6282 inside day men and 3291 outside day men. The average time worked in machine mines was 173 days. The average number of tons of lump coal mined by machine runners for the year was 5120, and per runner per day, 29.6 tons; the average tons of lump coal produced by drillers, shooters and loaders for the year was 709 tons, and per loader per day, 4.1 tons. The number of mining machines in use in machine mines was 1266, while 275 motors were employed.

Belmont county showed the largest production, 4,467,295 tons, an increase of 595,449; Athens second, 4,370,912 tons, an increase of 522,472 tons; Guernsey county, 3,348,934 tons, an increase of 452,178 tons; Jefferson county, 2,998,476 tons, a loss of 339,323 tons; Perry, 2,609,701 tons, an increase of 210,131; Hocking county, 1,553,507 tons, a loss of 142,256; Jackson county, 1,452,176 tons, a loss of 435,728 tons; and Tuscarawas county, 1,429,565 tons, a gain of 68,171 tons.

There was one life lost for every 214,279 tons of coal mined, whereas in 1905 it was 226,628 tons, showing the increased danger to which the miner of the present day is subjected, and the necessity for new mining legislation in order to properly protect those who work underground. There was one life lost for every 366 persons employed.

The average number tons run-of-mine coal produced by pick miners for the year was 661 tons, and per man per day, 3.8 tons; the pick tonnage decreased 324,862 tons; the average number tons run-of-mine coal produced by machine runners for the year was 7155 tons, and per runner per day, 41.4 tons; the average tons run-of-mine coal mined by the drillers, loaders and shooters for the year was 991 tons, and per day, 5.7 tons. The machine coal increased 1,703,700 tons.

One thousand six hundred and seventy-seven visits were made to the mines in the State by the chief and district mine inspectors.

*Advance figures.

†Chief mine inspector, Columbus, Ohio.

Personal

Mining and metallurgical engneers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

C. L. Tilton, of Apex, Colo., is making a business visit to Kansas City.

George W. Mabee, Jr., of Manhattan, Nev., has been making a visit to Colorado points.

J. C. Haas, of Spokane, Wash., has been examining properties in the Cobalt district in Ontario.

E. W. North, of Omaha Neb., has been in Gilpin county, Colo., on a visit to mining interests.

Dr. C. B. Gibson, of Chicago, is looking after mining interests in Gilpin county, Colorado.

F. A. Webster, of Empire, Colo., has gone to Webster, Colo., to make an examination of mining property.

J. M. Thexton, of Idaho Springs, Colo., has gone to Hillsboro, N. M., to superintend the erection of a reduction plant.

Dr. R. W. Raymond has returned to New York from a trip to the West Indies, taken for the benefit of his health.

William O'Connor, of Terre Haute, has been appointed deputy mine inspector for Indiana by State Inspector James Epperson.

Eugene Coste, of Toronto, Ont., is supervising oil-boring operations in Saskatchewan and Alberta, in western Canada.

A. G. Brownlee, of the Stanley Consolidated Mines Company, of Idaho Springs, Colo., has returned from a trip to Europe.

David Ellis, of the Pittsburg Consolidated Mines Company at Idaho Springs, Colo., has returned from a business visit to Pittsburg.

H. F. Riebling has completed the examination of one of the Greene properties in Chihuahua, Mexico, and has returned to Colorado Springs.

W. F. Hogan, manager of the Gunnell Mines and Milling Company at Central City, Colo., is making a business visit to Boston and other eastern points.

James A. McCracken, of the Copper Jim Mining Company operating near Tolland, Colo., has returned from a visit to Georgia and other Southern States.

George MacDonald has resigned his position as superintendent of the McKinley-Darragh mine, at Cobalt, Ont. E. C. Readers succeeds him as superintendent.

W E. Defty, for two years past general manager of the Compañia Mina Juarez, at Caborca, Sonora, Mexico, has resigned that position to become consulting engineer for the company.

N. Lilienberg, Philadelphia, metallurgical engineer and representative of Swedish iron and steel manufacturers in this country, sailed April 11 for an extended sojourn in Sweden.

E. T. Murphy has resigned from the B. F. Sturtevant Company's New York branch to accept a position with the Buffalo Forge Company, operating from its branch office in New York.

Virgil H. Hewes, of New York, was recently at the Pacific Coal Company's colliery at Bankhead, Alberta, Canada, in connection with the installation there of a fine coal-briquetting plant.

D. F. Morgan, chemist at Star Furnace, Jackson, Ohio, will enter the service of the Jackson Iron and Steel Company on May 1, and will be in charge of the new furnace that company is building at Jackson.

Frederick Keffer, the president of the Canadian Mining Institute, and engineer in charge of the British Columbia Copper Company's mines, has returned to Greenwood, B. C., from a visit to Toronto and New York.

F. H. Daniels, chief engineer of the American Steel and Wire Company, has returned to this country after an absence of several months in Europe, where he has made a tour of industrial plants to look over recent improvements.

Dr. Otto Wuth, of Pittsburg, Penn., on account of ill health, has turned over his laboratory equipment, and the good will of his business as assayer and metallurgist, to the well-known firm of Crowell & Murray, Cleveland, Ohio.

Colonel Parrott, consulting mining engineer, of Johannesburg, South Africa, will be in London about the end of April on professional business. His address is care London & Paris Exchange Ltd., Moorgate street London, E. C.

William S. Johnson, for the past 12 years assistant engineer of the Masachusetts State Board of Health, has opened an office at 101 Tremont street, Boston, for the practice of civil engineering. Special attention will be given to water supply and sewerage.

F. F. Sharpless spent March in the Telluride district in Colorado and then made a short visit to the copper camps of Routt county. He is now in Oaxaca, Mexico, whence he will return to Denver about May 1 and to New York about the middle of the month.

Lorain F. Loree has been chosen president of the Delaware & Hudson Company, in place of David Willcox, resigned. He has been president of the Baltimore & Ohio and the Chicago, Rock Island & Pacific, and is a railroad man of much experience, but not a coal man.

W. M. Brewer lately made a trip from Victoria, B. C., to one of the Queen Charlotte islands in northern British Columbia. The production of copper ore there has been commenced by a Japanese company, which is opening up what gives promise of developing into a valuable mine.

Thomas L. Watson, professor of geology in the Virginia Polytechnic Institute, has accepted the professorship of economic geology in the University of Virginia, at Charlottesville. Professor Watson will enter upon his duties at the university at the beginning of the next session.

F. Cushing Moore has resigned his position as chief engineer of the Federal Mining and Smelting Company and has resumed the practice of his profession in Wallace, Idaho. He will devote considerable attention to examining and reporting on mining properties, supervising the installation of mining machinery and general consulting work.

David Willcox has resigned his position as president of the Delaware & Hudson Company, on account of ill health. He had been connected with the company for many years, serving as its general counsel, and later as president. He was thoroughly acquainted with the anthracite trade, and was prominent in all matters connected therewith.

Thomas Kiddie, who succeeds Paul Johnson as manager of the Alaska Smelting and Smelting Company's smelter at Hadley, Prince of Wales Island, Alaska, has gone north to take over charge of the works and to ascertain what changes will be necessary for the installation of the Kiddie hot-blast system, described in the JOURNAL of Sept. 29 last.

Capt. T. H. Trethewey has retired from the management of La Plata mines, British Columbia. He will remain on the board, however. He has other mining interests that require his personal attention. He is succeeded by his son, W. J. Trethewey, who assumed charge April 1. The mine is producing and making regular shipments to the Trail smelter.

Obituary

Epes Choate, engineer in the mechanical department of the Cananea Consolidated Copper Company, was killed, March 22, in Cananea by falling into the flywheel of an engine, where he was terribly mangled.

Ruben Hockweil died in Mexico City of pneumonia, Feb. 24, at the age of 64 years. Mr. Hockwell was a mining engineer, born in Devonshire, England, but had lived the last 23 years in Mexico. He was just closing up his affairs in Mexico preparatory to returning with his wife to reside permanently in his native country when he was taken sick.

John A. Kebler, general manager of the coal-operating department of the Colorado Fuel and Iron Company, died suddenly at Trinidad, April 12, from ptomaine poisoning. When visiting the com-

pany's mines at Cuatro, Mr. Kebler was taken violently ill. He rallied, however, and a day or two later was reported out of danger. Mr. Kebler was about 45 years of age and was appointed a year ago.

Dr. W. H. Drummond, of Montreal, died at Cobalt, Ont., April 6, aged 53 years. He was born in Ireland, but came to Canada as a boy. Educated as a physician, he gave much time to literature. When the Cobalt excitement began he went into that country, where he was one of the pioneers, and with his brothers Thomas J. and George E. Drummond, of Montreal, owned and operated the Drummond mine, which was one of the earliest discoveries. Dr. Drummond had been in failing health for some time, but left Montreal for Cobalt shortly before his death on account of the breaking out of smallpox among the miners. He had a widespread literary reputation as the author of French Canadian dialect poems and other works on the Quebec "habitant." He was a man of great personal charm and his early death will be regretted by many friends.

Societies and Technical Schools

Engineers' Club of Philadelphia—At the regular March meeting Professor Alleman read an interesting paper, describing the present methods of treating timber to preserve it from decay. He gives statistics of cost, tending to show where results would justify the treatment. The paper was discussed by a number of members.

Industrial

The Crocker-Wheeler Company, Ampere, N. J., has opened a branch office in Birmingham, Ala., in charge of B. A. Schroder.

The offices of the Lackawanna Steel Company, in New York, have been removed to the new United States Express building, No. 2 Rector street.

The American Steel and Wire Company, will build a wire mill at Newburg, Ohio, this summer near the Emma furnace. The plant will employ 1000 men and will have a capacity of 600 tons a day. A site has been purchased and the ground will be broken immediately.

The Cleveland Car Company, West Park, O., is increasing its plant extensively, owing to the rapid increase in work, and in construction of heavy industrial cars which it is making a specialty of in connection with the lighter work. The company expects by May to be in position to take on extra work, owing to this increase.

Otto Herrmann & Co., public accountants and auditors, have opened offices at Iron Mountain, Mich., and are prepared to undertake regular or occasional audits and examinations of the books and records of mining and smelting companies; also to devise office systems especially adapted to mining or metallurgical operations, to install cost systems, to make periodical examinations or for any expert service.

G. F. Ehrenzeller announces that he has removed his main office from New York to the Pennsylvania building, Chestnut and Fifteenth streets, Philadelphia. He continues to represent Beer, Sondheimer & Co., of Frankfurt-a.-M. and London, exclusively for all their interests in material of all descriptions with the iron, steel and kindred trades on the continent of North America. The material includes pig iron, ferromanganese, spiegeleisen, ores, metals and all descriptions of ferroalloys, and other raw material.

On May 1 the Chicago branch of the Niles-Bement-Pond Company will occupy new offices on the sixth floor of the new Commercial National Bank building, Clark and Adams street, Chicago. The Pratt & Whitney Company will abandon its show room and offices on South Canal street, and will combine its machinery sales department with that of the Niles-Bement-Pond Company. George F. Mills, who has for several years looked after the interests of these companies in the Chicago territory, will continue as manager of the Chicago offices.

The Davis Trap Rock Quarry Company has under construction a new trap-rock crushing plant at a quarry recently opened at Green Lane, Montgomery county, Penn. The equipment for the present comprises a No. 3 Gates breaker, three 9x15-in. Blake crushers, one 60-ft. Gates elevator, and one 48x20 Gates screen, all built by the Allis-Chalmers Company, of Milwaukee. The capacity of this plant when completed, and in full operation, will reach 600 tons daily of crushed trap rock, screened into railway ballast and commercial sizes for concrete use.

A decision was recently handed down by the United States Circuit Court of Appeals for the Ninth Circuit in favor of the Abner Doble Company in the Dodd bucket case, which was carried to the higher court by the appellant, the Pelton Water Wheel Company. This case was brought, in 1902, in the United States Circuit Court, the complainant alleged infringement of the Dodd water wheel bucket, patented June 23, 1891, and afterward asigned to the Pelton Water Wheel Company. Judge Morrow handed down his decision on Nov. 20, 1905, holding that the Doble bucket was not an infringement, as alleged, and dismissed the complaint. The appellate court now affirms Judge Morrow's decision.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Stephens-Adamson Mfg. Company, Aurora, Ill. "Conveying and Transmission." Pp. 48; illustrated; paper; 6x9 in. February, 1907.

Allis-Chalmers Company, Milwaukee, Wis. Bulletin 1418. Allis-Chalmers Steel Ventilating Fans. Pp. 12, illustrated, paper, 8x10½ in.; Sept. 1906.

The Denver Fire Clay Company, Denver, Colo. Bulletin No. 19. The Case Laboratory Crusher. Bulletin No. 23. Case Gasoline Furnaces. Bulletin No. 24. Assay Utensils. Pp. 4, illustrated, paper, 3½x6 inches.

G. E. Witt Company, 1165 Howard street, San Francisco, California. Catalog No. 6. Little Giant Crude Oil Burners, Pump Governors, Reducing Valves, Oil Plants and Machinery. Pp. 39, illustrated, paper, 5x7 in. 1907.

American Concentrator Company, Joplin, Mo. Bulletin No. 10. N. C. Crushing and Screening Machinery. Pp. 20. Bulletin No. 11. N. C. Differential Motion Jigs. Pp. 20. Bulletin No 13. N. C. Coal Washing Machinery. Pp. 28. Knowles New Century Magnetic Separator. Pp. 12. All illustrated; paper; 1x10 in. 1907.

Fort Wayne Electric Works, Fort Wayne, Ind. Bulletin No. 1087. Standard Direct-Current Switchboard Panels. Pp. 12, Nov. 1, 1906. Bulletin No. 1089. Standard Alternating Current Switchboard Panels for Single Phase Circuits. Pp. 11, Jan. 1, 1907. Bulletin No. 1090. Series A. C. Arc-Lighting System. Pp. 20, Jan. 10, 1907. Index to Bulletins Nos. 1001 to 1089. Pp. 4, Jan. 1, 1907. All illustrated; paper; 8x10½ in. Instruction Book No. 3024. Fort Wayne Series A. C. Arc Systems. Pp. 31; illustrated; indexed; paper; 4½x7 in.; November, 1906.

Construction News

Pine Creek District, Colorado—The Ingram Mining Company intends to put up machinery and a stamp mill. Ira Pollard, Apex, Colo., is manager.

Georgetown, Colorado—The Cashier company proposes to erect a 25-ton concentrating plant soon. L. G. Shepard, Georgetown, Colo., is manager.

Loomis, Washington—The Copper World Mining Company will install a hoisting plant as soon as the snow is off Palmer mountain. Address at Loomis.

Gregory District, Colorado—The Colorado & Southern Mining Company intends to install an air-compressor plant. W. L. Shull, Central City, Colo., is manager; main office being in Cooper Building, Denver, Colorado.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Denver, Salt Lake City, San Francisco and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

April 11—Since the breaking of the recent storm most of the water and electric power plants have been put in order again and the mines started up. The miners were laid off meantime. The rains and snows have been very heavy in the mountain counties and the snow has piled deep and hard, insuring a bountiful supply of water for mining the coming summer. Land slides have done some damage and many mines have been flooded, so that nothing but pumping could be done. In some cases the pumps have been lost, entailing much trouble and ultimate expense. A number of miners and prospectors in the upper country were cut off from supplies and hemmed in by snow, but few fatalities have been reported. So much surface water has got into the mines that it will be some months before the larger ones will see the bottom of their shafts. In the smaller camps in the high mountains they have been cut off from all communication, and the mail has had to be carried in by men on snowshoes.

The Pennsylvania Oil Company of Lompoc, Santa Barbara county, has contracted to sell to the Union Oil Company 500,000 bbl. of oil for $270,000, or 54c. a bbl. This price is higher than any contract ever made in the district. it is believed. The Pennsylvania has strong new wells in the Lompoc section. The Standard is pressing hard for lands in the field between Santa Inez and Lompoc, and its agents have been after options for months.

The first shipment of pipe for the new line of the Standard Oil Company to the oilfields of the Midway and McKittrick districts has been received at Bakersfield. The building of the line 68 miles in length, is the result of the contract recently signed by the independent producers of the Midway fields by which the Standard Company obtains the oil of the district for 30c. a barrel. By contract, the line must be ready to handle the Midway Oil in six months. An 8-in. pipe will be used, and pumping stations will be established at McKittrick and Midway.

E. B. Maginnis, L. F. Maginnis, and J. T. O'Leary have brought a suit against the Yellow Aster Mining Company for damages to the amount of $150,000 for ore alleged to have been taken from the mining claims of the plaintiffs through the underground workings of the defendant. The plaintiffs are the owners of the Rustler and San Diego mining claims, and the defendant is the owner of the Yellow Aster, the Trilby, the Olympus, the Wedge, the Rand and the Bonanza Fraction claims, all of which are in the Rand mining district near Randsburg, Kern county, and adjoin the claims of the plaintiffs. The plaintiffs claim that the Yellow Aster workings extend beyond the boundary lines of the Rustler and San Diego claims and that the Yellow Aster Company has removed ore from the latter claims to the value of $50,000. The plaintiffs ask for an injunction to prevent further removal of ore, for the privilege of entering the Yellow Aster tunnels with surveyors to ascertain whether their contention is correct, and for the damages as stated.

Furnace No. 1 of the Mountain Copper Company at Keswick, Shasta county, has been blown in after about two years idleness. Ore from the Iron Mountain mine will be treated, until the branch railroad to the Hornet mine, owned by the same company, is finished. The furnace will treat 150 to 175 tons daily and the surplus will be shipped to the other reduction works of the company near Martinez on the upper part of San Francisco bay. For the present the fluxing ore will come from the mines in Shasta, Texas Springs, Rock Creek and Flat Creek districts; in the districts are many small quartz properties which can now be again worked, for the quartz mine owner gets virtually 90 per cent. of the assay value and has no expense in building or maintaining reduction works. While the smelter was inactive the mines between Lower Springs district and Keswick were obliged to close down, but work has now been resumed upon them all. The Gold Leaf is the largest producer, except the Brackett. An electric plant has been put in and an electric hoist installed. An aërial tram is also being built. The largest amount of high-grade ore has come from the Brackett, the shipments averaging $90 per ton. At the White Oak a steam hoist has been installed. The Milton and Simmon mines are both producing. The Capitol and Garracht mines are also again in operation. The chain of producing mines is some five miles in length, and there are many smaller ones. These mines can either ship to Keswick or to the Mammoth smelter at Kennett, the tariff sheet for ores being the same at both places.

Salt Lake City

The option held by Frank J. Hagenbarth, of Salt Lake, on the Ludwig copper mine, at Yerington, Nev., has been surrendered. It is probable that the property will now be purchased by the Nevada-Douglas Copper Company.

Eastern parties connected with the Continental Alta Mines & Smelters have been here during the past week investigating the project of building a railroad into the camp of Alta. It is proposed to construct a standard gage line as far as Wasatch, to which point it is proposed to deliver ore by means of an aërial tramway about five miles in length.

It is the intention of the State to probe further into the railroad and coal situation in Utah, and before adjournment the Senate appointed a commission with power to conduct hearings during the legislative recess.

President John Dern, of the Consolidated Mercur, has issued a circular to shareholders, in which the passing of the usual quarterly dividend is explained. The company was compelled to close down wholly or partially during the winter, by the coal shortage, and for that reason was unable to earn enough to meet the dividend requirement.

The Cluster Mining Company, of Bingham, has been made defendant in a suit to settle the question of apex over the First Extension Yosemite West lode mining claim. The Bingham Consolidated Mining Company, and others, are plaintiffs.

Scranton

April 15—A campaign is to be organized by the United Mine Workers, beginning in Scranton, to bring back into the fold the thousands of members who have left the organization. It is estimated that fully two-thirds of the men are now outside the union, so that its financial affairs are in a serious condition. President John Mitchell and the ablest national organizers will have charge of the campaign.

Quite a sensation has been caused in Pennsylvania by the lower branch of the legislature passing a bill which will prohibit any person under 21 years of age working in or around a coal mine. The measure was first introduced at the instance of the labor representatives, who are very strong in this session, but little attention was given it. The provisions are so drastic that it will throw thousands of young men out of employment. Recently, however, Representative Garner, the leader of the labor element, asked that the bill be passed on second reading, and so persistent was the fight, that before the members in general realized

it, the labor men had secured sufficient support to pass the measure. There will be a strenuous opposition in the senate.

The officials in charge of the miners' relief association among the employees of the Hillside Coal and Iron Company, and the Pennsylvania Coal Company, are more than pleased with the success of the movement thus far. There are 1200 employees of the Pennsylvania on the membership roll, and 1110 employees of the Hillside company.

Since the mine inspectors of the anthracite field went to Harrisburg to oppose the bill making mine foremen eligible for mine inspectors, without passing the usual examination, more opposition has developed to the measure. It is contended that the bill would be in violation of the constitution of Pennsylvania inasmuch as it would make a favored class of the mine foremen while it would compel all other applicants to pass the required examination. There is a growing sentiment that the matter of appointing mine inspectors should be taken entirely out of the political field.

Fire destroyed the boiler house of the J. S. Wentz Coal Company at Hazel Brook. Fortunately the breaker adjacent was saved.

Mine Inspector Martin McLaughlin has ordered a portion of the mine workings in the water level of the Susquehanna Coal Company to be closed, in the Hickory Swamp colliery, as there was no outlet for the miners in the event of a squeeze.

The State house of representatives has passed the eight-hour bill for the anthracite mines and its advocates are sanguine that it will be passed by the senate.

The lead mines at Almedia, near Bloomsburg, are to be reopened by Allentown capitalists.

A 14-ft. vein of coal has been struck in the tunnel being driven from No. 4 slope in the Gama vein to the new Buck Mountain vein recently sunk.

The Lehigh Valley Company has notified its tenants of an increase of 25 per cent. in ground rents. This was done because the assessments were increased from $500 to $2000 an acre.

The Conciliation Board, at its last meeting, was deadlocked over the question as to whether it had the right to make rates and define the conditions of employment at collieries where a uniform rate does not exist. The question will be referred to the umpire.

In the grievance of the miners employed at the Dickson colliery, of the Delaware & Hudson, the umpire found in favor of the company. The men claimed that the rate for taking down sandstone roof had been decreased 55c. a yard. The umpire upheld the contention of the company that the conditions were new, and that a new contract had been made.

Toronto, Ont.

April 10—The details of the provincial mining tax have been announced in the Ontario Legislature. A tax of 3 per cent. will be imposed on the profits of all mines yielding over $10,000 in profits per year, those below that figure being exempt. It was originally intended that this tax should be imposed on a sliding scale, the percentage increasing with the amount of the profits; but, owing to the strong protests of the mining men, this plan was dropped and the flat rate substituted. A rebate of the tax will be given on iron ores when the same are smelted in Canada. Natural gas will be taxed 2c. per 1000 ft., 90 per cent. of the tax to be remitted where the gas is used in Ontario. An acreage tax of 2c. per acre is imposed on all mining locations in unorganized territory.

An important change has been made by the Canadian government in the regulations respecting the acquiring of coal areas in the West, with a view of preventing their alienation into absolute control of private parties, and to securing prompt development of the areas opened up. The previous regulations allowed purchasers to buy surface rights at $3 per acre and coal rights at $7 per acre, under which conditions large areas were bought up, and held for speculation. It is believed, however, that as much coal-bearing land still remains under government control in Alberta, Saskatchewan and the Peace River district as has been alienated. Hereafter 21-year leases only will be granted, the areas being of limited extent at a yearly rental to be fixed, probably at $1 per acre.

W. G. Trethewey has purchased the small smelter at Hamilton, which was used for some time by the North American Cobalt Refining Company for experimental work, but abandoned in favor of another site at Thorold. Mr. Trethewey has withdrawn from the North American company, and the Trethewey ore will now go to Hamilton for treatment.

Cobalt, Ont.

The number of claims taken up in the Larder Lake area is stated at about 3000, covering some 120,000 acres. The population is increasing at a rapid rate, and building is being pushed ahead to accommodate the influx.

A new goldfield is being worked in the Abitibi country some 70 miles north of Englehart, a station on the Timiskaming Railway, where Dan Mosher and Capt. F. W. Coates have staked over 20 claims and have had a gang of men at work for some months. There are several shafts sunk and the quartz, in addition to silver and copper shows gold values. A number of prospectors are working in the neighborhood.

London

April 4—The shareholders in Stratton's Independence have received the welcome news this week that Philip Argall has reported favorably on the prospects of utilizing the large amounts of low-grade ore on the dumps, and in the mine. His cabled report states that the ore on the dump averages $3.50, of which he estimates that he can extract by cyaniding about 70 per cent., or say $2.50, at an expense of $1.50 per ton. In order to obtain these results it is necessary to mill 10,000 tons a month, and the plant required will cost about $200,000. Mr. Argall has not so far attempted to make any estimate as to the amount of ore on the dump or in the mine, but judging by the previous reports of engineers and officials of the company there must be five or ten years' supply of ore on the dump, and an indefinite amount of ore in the mine. This latter will be probably of higher grade than that on the dump, or, at least, a good deal of it will be, and it should repay the extra cost of $1 or so in delivering it to the surface. The company has a large reserve of undivided profit in hand, and can pay for the new plant without calling on the shareholders for any assessment. The estimated income from the treatment of these low-grade ores on the dump will not be a big one, considering the capital of the company, but should be enough to pay 10 per cent. on the present price of the stock. The present quotation is 4s. for the £1 shares.

The financial results of the Rio Tinto company for 1906 reflect the high price of copper. The ordinary dividend worked out therefore at 110 per cent., as compared with 80 in 1905 and 70 in 1903 and 1904. The market in Rio Tinto shares has been a sheer gamble for months past. A year ago, it will be remembered, the directors fixed £63 as the price of the new £5 shares created for the purpose of extinguishing the debentures. This price did not remain for long, as quotations gradually went up and a month ago the figures were well above £100. The price is now about £85. In many quarters it was supposed that the distribution would be greater than 110 per cent., which may partly account for the big rise in quotations. In other quarters the rumor that the output was to be greatly augmented gave a fillip to the quotation. The Rio Tinto never tells what it is doing or what it intends to do until it thinks fit to do so, so I cannot say whether these rumors have any basis of fact. It is difficult to believe that such a policy can be carried out, at any rate for the present, because the shortness of water supply at the mines in Spain is even now crippling the operations of the company to some extent. When the water difficulty is overcome, if it ever is, it is likely enough that the board will extend the output.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Alabama

CLEBURNE COUNTY

Southern Mica Company—This company has bought a tract near Heflin, and is preparing to mine mica and put it in condition for market. E. H. Fisher is manager.

Tallapoosa Placers—Philadelphia parties have bought a large tract along the Tallapoosa river, near Hightower. They intend to work the property for placer gold.

Alaska

JUNEAU DISTRICT

Alaska Mexican—This company is installing a new hoist, with the intention of sinking the main shaft to greater depth.

Eagle River—This mine has started up, under charge of B. Thane as superintendent.

Mills Mine—This property, on Chicagoff island, has been sold to C. D. Lane, of San Francisco.

Rubicon—This company is making arrangements to start active work on its property in Silver Bow basin.

Arizona

GRAHAM COUNTY

Arizona Copper Company, Ltd.—This company reports the output of its mines at Clifton in March at 1372 short tons of copper.

PIMA COUNTY

Cleveland-Arizona—This company has begun to ship ore from its property at Silver Bell. Work has been going on for some time, and an orebody of good size has been developed, running well in copper. There is also a body of low-grade ore, which is to be concentrated before shipping. E. C. Kenney, of Cleveland, Ohio, is president, and Percy Williams, of Tucson, Arizona, is manager.

Paymaster—This mine, near Silver Bell, is being opened up again, and promises well. Near the surface it was worked as a silver-lead property, but copper ore is developing as depth is attained. It is expected that shipments will soon be begun. Luke Corda is in charge of the work at the mine; Percy Williams, consulting engineer.

YAVAPAI COUNTY

The Prescott city council has granted to Detroit parties a lease of 80 acres of the city ranch, on condition that the lessees build and operate a smelter upon the leased premises, the company to begin the erection of the proposed smelter within six months, and to be ready to smelt ore in one year. The site carries with it sufficient water to supply a 1000-ton plant. From a canvass of a part of the mine-owners and operators whose properties lie south of Prescott, 400 tons per day is assured, and it is confidently stated by the promoters that within six months they can secure 1000 tons per day. This point is desirable for a smelter, as the county produces many kinds of ore and Prescott is the central point. Fluxes can be easily secured almost on the ground, and silica within a short distance.

De Soto—This mine, at Middleton, is shipping three cars of copper ore each day to the smelting plant at Humboldt, besides shipping three cars to its mill, also at Humboldt.

Rigby Reduction Plant—This plant, after undergoing many changes, will again start in a few days.

California

AMADOR COUNTY

Copper—The copper mine at Fink's ranch owned by Johnson Bros., has been bonded to parties connected with the Selby Smelting Company, who will prospect it.

EL DORADO COUNTY

Eureka Slate Company—The aërial cable which carries slate from the quarry is to be extended two miles further to the railroad line, making 4½ miles in all.

INYO COUNTY

Borax—W. P. Lass is developing two claims of colemanite in the Funeral range, 7 miles northeast of Greenwater. A 5-ft. ledge has been found.

Queen—The reported strike in the Queen shaft of the Greenwater & Death Valley Company has been confirmed, and is considered as evidence that the copper ore continues with depth.

KERN COUNTY

Copper—H. Phillips and the Hart Brothers have discovered high-grade copper ore in Caliente cañon, not far from the old Amalie mine, and 50 claims have been located in the vicinity during the past month. Los Angeles men have become interested in the claims.

California-Mohawk Mining Company—This company owns eight claims in Valley View mountain district, and development is being done by both shafts and tunnels. A mill is to be installed shortly.

MONO COUNTY

Masonic District—There are now 150 men at work in this district and several properties have changed ownership. On the Calivada an air compressor and machine drills have been ordered. On the Pittsburg Extension, Myrtle and Julia, and Pittsburg Liberty considerable development work is in progress. For the Masonic Gold Mountain a hoist has been ordered, and it is expected that a 20-stamp custom mill will soon be installed in the camp.

NEVADA COUNTY

Meadow Lake District—Frank Du Bois, of San Francisco, has sold to W. A. Jackson, of Los Angeles, Cal., his interest in the Nevada Queen, Ethel, Molybdenum and Nevada Queen Extension mines in this district. He has also transferred to the same party a one-half interest in the Copper Queen and Summit Copper claim in the same district.

PLACER COUNTY

Crater—This mine at Ophir is under bond to W. P. Hammon, of Oroville, who is grading for a power plant to pump it out.

Iron Mine—L. C. Trent has men sinking a shaft at the mine and is putting in a steam hoist.

PLUMAS COUNTY

Indian Valley—Superintendent Franz now has 20 men at work making preliminary arrangements for starting the 3000-ft. tunnel to tap the body of ore which was worked at the upper levels of this mine at Greenville.

Plumas-Mohawk Mining Company—This newly organized company owns the following claims near Johnsville: Grizzly Bear, Rozie, Squirrel Creek, St. Joseph, and Eureka, all near the Plumas-Eureka mine. A 10-stamp water-power mill is to be erected at once.

SAN BERNARDINO COUNTY

Gold Dollar Extension—This company is working an extension of the property of the California Hills Company in the Gold Bend district, Sunrise mountains, 20 miles south from Needles and west of the Colorado river. The company has 130 acres and claims 3000 ft. of the vein running through the California Hills Gold

Dollar claim. The two companies are controlled largely by the same people and Superintendent H. M. Phinney has charge of both.

SIERRA COUNTY

Fruitvale Mining Company—In addition to the big strike of free-milling gold ore recently made in this mine on the north slope of the Middle Yuba river, there is reported a very important find of arsenical sulphurets.

SISKIYOU COUNTY

Elliott Creek—On this creek, 5 miles northwest of Garrison Springs, two prospectors have found a 4-ft. ledge of high-grade gold ore.

TRINITY COUNTY

Golden Jubilee—At this mine, Trinity Center, Wm. Chapman, the superintendent, has 30 men on the roll, and has put in 10 more stamps.

Trinity Gold Placer Syndicate—Superintendent Louis Maitland is putting on more men at this mine in Copper creek, 15 miles from Carrville.

TUOLUMNE COUNTY

Harvard—About 75 men are now at work and 40 stamps of the mill are in action.

Colorado

CLEAR CREEK COUNTY

Board of Mines and Trade—The new officers elected at Silver Plume are as follows: President, C. S. Desch; vice-president, W. H. Stephens; secretary, W. J. Guard; treasurer, A. B. Clark.

Uncle Jack Mining Company—Denver and Eastern people are interested in the incorporation of this company, having taken over the Abeel property at Empire, with W. R. Jones, of Empire, Colo., as manager.

Ramsdell Mining and Milling Company—A contract has been given to Hendrie & Bolthoff, of Denver, at $22,000, for the erection of a 75-ton mill. G. W. Teagarden, Georgetown, Colo., is manager.

GILPIN COUNTY

Dirigo—Louisville, Ky., people are reported in the purchase of the Dirigo group in Hawkeye district, deeds being filed this week showing a consideration of $20,000. The company intends to enlarge the mill capacity this spring, as well as put in an aërial tramway from tunnel to mill. G. H. Elling, Denver, Colo., is manager.

Faraday—Chicago people are interested and during the past week ore has been uncovered in the shaft which carries high gold, silver and copper values. C. B. Gibson, Central City, Colo., is manager.

Gilpin County Chamber of Commerce—The directors have elected the following officers: President, W. C. Matthews, Central City; first vice-president, Thomas Dunstone; second vice-president, H. C. Bolsinger; secretary, Percy R. Alsdorf, Central City; treasurer, Walter A. Funk.

Gold Run—Hirsch & Co., of New York, who are interested in the operations on this group near the head of South Boulder creek, are reported intending the installation of an air-compressor plant at an early date. G. Mosch, Tolland, Colo., is superintendent.

Gregory-Buell Consolidated—It is reported that the existing difficulties between stockholders have been settled and that as soon as certain matters can be adjusted operations will be resumed again, possibly under new management.

Receipts of Machinery—A Rand-Ingersoll air compressor for the Gold Collar in Enreka district; a Rand compressor for the Aztec in Central City district; a Rand Quartz Valley district; duplex pump for Frue vanner by W. Hearne & Co., in Quartz Valley district, duplex pump for the Champion near Rollinsville.

LAKE COUNTY—LEADVILLE

Big Evans Gulch—During the week L. R. Johnson, mayor of Boulder, Colo., succeeded in securing a lease on the Bevis, Hidden Treasure, Sovereign, and Fairmount claims, south of the Mammoth, and will start to sink a shaft on the latter claim before the middle of the month; the shaft will go down 400 ft. when it is expected the blue lime will be caught. A. V. Bohn, before May, will resume operations on the Pawnolas group to the west of the Mammoth, and will sink the main shaft deeper. The unwatering of the Mammoth shaft is progressing favorably, and the water is now down to 600 ft.; by the middle of the month the bottom of the shaft should be reached. Further up the gulch, at the Boulder shaft, the water has been lowered to 385 ft., where a winch is being installed to lower a sinker which will continue the unwatering of the shaft until the bottom is reached. The producing properties in the section—the New Monarch Mining Company, Little Ellen, Silent Friend, Izaard—are shipping the usual quota of ore.

Cleveland—The lessees on this property, California gulch, are driving a tunnel and recently opened a body of ore that runs ½ oz. gold, 4 per cent. copper and 12 oz. silver per ton; a shipment will be sent to the smelter soon. When the lessees started to drive the tunnel it was with the intention of opening a body of zinc ore some distance in the hill, so the striking of this copper orebody was a surprise.

Forepaugh—At this mine, East Fryer hill, the lessees have succeeded in controlling the water, and are now shipping 30 tons of silicious ore daily, netting in the neighborhood of $30 per ton; the ore comes from one of the lower levels. Adjoining territory has been secured by the lessees and will be worked from the Forepaugh shaft.

Hibschle Shaft—This property, head of East Seventh street, is coming to the front as one of the heaviest producers in the down-town section. Several years ago the property was worked for the iron ore it contained in the upper contact, and when exhausted it was the prevalent idea that the mine was played out. Several months ago W. H. Covey secured a lease on the ground and sunk the shaft another 200 ft., making it 440 ft. deep; he then drifted west to the Elk fault, crossed it and on the other side opened a body of iron and lead ore, from which he is today shipping 80 tons regularly.

Iowa Gulch—Major A. V. Bohn has succeeded in organizing a company to operate the Aurora group, embracing 60 acres of ground. The claims are on the divide between Iowa and Empire gulches and adjoin the Helena and Ready Cash, both shippers. The property has been worked off and on for a number of years, but never systematically, and during that time three tunnels were driven into the hill, the lower one a distance of 700 ft. It is the intention of the new company to drive this tunnel another 400 ft. into the hill, which will give a depth of 600 ft. from the surface; it will drain the hill and permit the company to prospect the territory. The officials of the Aurora Mining Company are: A. V. Bohn, president and manager; Roy H. Bent, Antwerp, N. Y., vice-president; George McAllister, Antwerp, N. Y., treasurer; A. S. Sharp, Leadville, secretary.

Iron Silver Mining Company—The properties belonging to this company are shipping 10,000 tons of ore monthly, the bulk of it coming from the Moyer and Tucson. At the latter nothing but development work is being carried on, and from this work 50 tons daily are being shipped. The ore is a lead, copper, iron and zinc sulphide.

O'Donovan Rossa—The work of retimbering and enlarging this shaft, South Carbonate hill, has been completed, and sinking it to the 600-ft. station will commence at once.

Progressive Shaft—Work has been resumed on this property, North Fryer hill, by lessees, and two carloads of a good grade of lead ore are being shipped monthly; the work is being carried on at the lower levels, 350 ft. from the old Robert E. Lee.

ROUTT COUNTY

Copper Claims—Canadian people are interested in the purchase of a group of copper mines on Yarwell mountain, near Steamboat Springs, the consideration being reported as $60,000, on which two substantial payments have already been made. Incorporation papers have been filed of the Yarwell Mountain Copper Company.

Copper Ridge—Incorporation papers showing capital stock of $30,000 have been filed; company owns a group of mines on Copper ridge. Bert Goldsworthy, Steamboat Springs, Colo., is manager. Company plans for installation of machinery for deeper operations.

Greenville Mining and Milling Company—Articles of incorporation have been filed. Charles Franz, of Greenville, has been appointed manager, and developments are to be carried out, with installation of machinery within a reasonable date.

Michigan

HOUGHTON COUNTY—COPPER

Osceola—The Federal court has granted the preliminary injunction restraining the Calumet & Hecla from voting the stock which it owns in this company, except for the purpose of further adjourning the annual meeting.

KEWEENAW COUNTY—COPPER

La Salle—This Calumet & Hecla property is putting a station at the first level.

ONTONAGON COUNTY—COPPER

Everything points to the coming summer as one of great activity on the south range, and some very fine prospects will likely be opened on the Baltic lode. The four producing mines—Mass, Michigan, Adventure and Victoria—are making arrangements to do a great deal of exploration work as soon as the weather will permit, with a view of opening up on that lode.

Indiana—This property has recently been taken over by new hands. R. G. Pryor is president; R. M. Edwards, secretary, together with J. H. Rice, Dean Robinson and Frank McM. Stanton. The Indiana property, comprising 1280 acres, is about a mile north of the Lake Copper Company's properties, is in sections 21, 27 and 28; town 51, range 37. The property is in the zone of the Baltic lode, and has two shafts down about 180 ft. each.

Lake Copper Company—This company will soon increase its force and start sinking on the Baltic lode which was shown up on the property by diamond-drill cores.

Michigan—This company is going to install a complete electrical equipment to operate the stamp mills at Keweenaw Bay.

Nonesuch—The Calumet & Hecla has ordered all work stopped on this property.

IRON—MENOMINEE RANGE

Pickands, Mather & Co. have completed arrangements for some substantial improvements to be made at the Baltic and Caspian mines, in the Stambaugh district during the present season. Contracts have been let for the installation of complete electric underground haulage systems at both properties. The power will be furnished by two engines, which also will supply the current for an electric lighting plant on surface. Plans have been received for a new engine-house, 40 x90 ft., on the foundations, at the Baltic. At the Caspian an engine-house 50x50 ft. in size, is now nearing completion. Work on a large new shaft-house at the Baltic will commence soon. An ore crusher is also to be erected at this property. It is the expectation that the output from these properties will be considerably increased this season.

Cleveland-Cliffs—This company has placed an order for a 60-drill Sullivan air compressor for its new Maas mine, at Negaunee. The machine will be of the Corliss cross-compound, condensing, two-stage type, with large receiver intercooler. The steam cylinders will be 24x46 in. in diameter, with a 48-in. stroke, and the air cylinders 40 and 24x48 in., with a displacement capacity of 4000 cu.ft. of free air per minute at 60 r.p.m., or nearly 5000 ft. at 70 r.p.m. The compressor will be built at the Chicago works of the Sullivan Machinery Company.

Missouri

JASPER COUNTY

Continental Lead & Zinc Company—This company has for years been one of the largest holders of mining properties in the Joplin end of the district, but last year became interested in the Webb City-Carterville district by purchasing the old Perry land, which has not been a very heavy producer in recent years. This company is developing the lower run of ore and is erecting a 300-ton concentrating plant, in which it will introduce an innovation to this district in the manner of hoisting. The mill is to be equipped with self-dumping skips instead of the regulation tub or can and cable. With this improvement it will be possible to hoist 1000 tons a shift whereas 300 tons is a good record under the old system. A hopper will be installed in the ground to feed the skips.

Tenderfoot—This old mine, between Prosperity and Duenweg, is producing ore and for the first time in its long career is a paying proposition. The Tenderfoot shaft was originally put down by Lord Hill, an Englishman who came to Webb City in 1890 and invested in several different ventures, but the panic of 1893 caught him hard and he lost everything. In 1901 Geo. M. Coburn, of Joplin, and a number of other parties secured a lease on 20 acres of the land on which the Tenderfoot was located from the owner, L. H. Baker, of St. Louis. They did some mining at that time but as the water was very strong and ore was selling at $20 per ton they could not make it pay. Recently they renewed operations and unwatered the lease, having discovered that the surrounding mines had greatly lowered the water and the past two weeks they have been outputting at the rate of 25 tons of zinc ore per week. They are mining and milling 80 to 90 tons of dirt per shift, from the 200-ft. level at a cost of 65c. per ton, employing but nine men in the ground.

Alpha—This company, at Spring City, south of Joplin, has for several months been outputting 50 to 60 tons of zinc ore and 10 to 12 tons of lead ore per week. The property is owned by Judge Pfost and others of Kansas City. They have been operating on the 100-ft. level, carrying a 7 ft. drift, 5 ft. of which is a sheet formation, and rich. These ore deposits are like troughs between ribs of flint, the ore vein being a conglomerate of lime, zinc and lead ore. The Alpha vein lies in a draw but keeps its level into the side hills.

Rob Roy—Burt Lyon has been drilling the south 40 acres of this tract and has developed something new for the district. Lime was encountered at 18 ft. below the surface and continued to 98 ft. when the drill went into a bed of silicate which proved to be over 40 ft. in thickness. If mineral at all is found under lime in this district it is zinc and lead, but this finding of silicate is a new record in this section.

Center Creek—John R. Holmes and John C. Cape have secured a lease on the Center Creek Mining Company's lease of some old ground that was worked out on the upper levels. They have moved a mill from one of their properties in Joplin to the lease and enlarged and remodeled it. Last week they made their first turn-in, amounting to 84,240 lb. zinc ore.

Labor Conditions—The labor conditions were never better in this district than at the present time. The cry is for more laborers, as many of the mine owners claim they cannot get enough men. The wages were never as high as at the present; $18 to 20 per week is made by the men in any class of work in the mines.

Montana

BUTTE DISTRICT

Amalgamated—Development has been resumed in all of the mines of the company and friendly interests, and will undoubtedly continue without further interruption, for the various labor unions, which caused a stoppage of this work Feb. 26, by demanding an increase in wages, have accepted the offer of the company managers and signed contracts in which they agree not to make further trouble for five years. Under the present schedule, miners will receive $4 a day so long as copper remains as high as 18c. per lb.; shaft and winze men will receive $4.50. The work resumed includes sinking the West Colusa, Badger State and Greenleaf shafts of the Boston & Mon-

tana; Tramway and Rarus of Coalition, and exploration of the vein at the 2400-ft. level of the Anaconda and Neversweat. Ore shipments from the companies' mines were heavy during March, the average quantity sent to the Washoe daily aggregating 7000 tons, the bulk of which was second class. Total shipments from Butte to this plant averaged 10,000 tons a day, the remainder having been made by North Butte, Coalition and smaller companies and individuals. Boston & Montana sent an average of 3200 tons a day to Great Falls, 600 being first class.

Butte Coalition—This company is producing between 1300 and 1400 tons of ore a day, 900 of which are coming from the Rarus. It is again driving the tunnel from the surface of the Tramway to connect with the Rarus shaft and is opening new bodies of ore in the Minnie Healey. Its Corra mine is practically non-productive, but is undergoing development.

Butte & London—The shaft is a little more than 900 ft. deep and will be taken to the 1500. It passed through a vein of mineralized material at the 900. The width is not known, for it more than filled the shaft from north to south. An assay of the rock showed a value of 0.7 per cent. of copper, 0.8 oz. silver and 40c. gold.

La France—The flood of water that caused a suspension of work in the lower levels of this property recently has been overcome, and development is progressing as before. Shipments average 200 tons a day. Report says that the Basin concentrator, an asset of United Copper, which was closed shortly after the Amalgamated bought the Heinze interests, will be remodeled, with a view of taking care of La France ore and ore which the Davis-Daly expects to strike within the next few months.

North Butte—The company is maintaining its heavy shipments, which aggregate between 1400 and 1500 tons a day. This is about the limit of the hoisting plant. It is finishing a large station at the 1800-ft. level of the main shaft and extending a crosscut north of the 1600 of the Jessie. Sinking in the Berlin shaft, with which this opening will connect, will be begun in a short time.

Nevada

ESMERALDA COUNTY—GOLDFIELD

The strike of the miners has been finally settled. The terms of the settlement have not been made public, but it is understood that the Western Federation of Miners carried its point and was recognized.

NYE COUNTY—BULLFROG

Denver—A new hoist has arrived at the mine, and will be placed in position without delay in order that this shaft may be sunk to the 150-tf. level. Good ore is showing in several parts of the workings.

Gibraltar—Development operations are being carried on in the lower levels. Good ore is showing, and a lot of specimen ore has been sacked for shipment to Salt Lake.

Little Ruth—A promising strike has been made in this property, which is situated on the northeast slope of Quartzite mountain, and about half a mile east of the Mayflower mine.

NYE COUNTY—KAWICH

The snow has melted from the greater portion of the Kawich ranges, and a number of prospectors have started out to work these claims. Some recent assays of ore from the Stirling group, situated between Eden and Gold Reed, averaged $235 per ton. This group will be vigorously developed during the summer. The Nevada Mines Company is preparing to operate its Kawich mines on a larger scale.

NYE COUNTY—TONOPAH

Gipsy Queen—The crosscut running north of the 400-ft. level is out 150 ft. The east drift, on the same level, is out 30 ft., and its face for a width of 6 ft. is in ore. A well-defined ledge 4 ft. in width, is also showing in the west drift from the 400-ft. level.

West End Consolidated—The principal work on this property is centered in the sinking of the two new shafts. The new working shaft has attained a depth of 60 ft., while the prospecting shaft, 600 ft. west of the working shaft, has been sunk 95 ft. Prospecting operations in the mine are confined to the locality of the big orebody on the 400-ft. level, 300 ft. west of the shaft. A large shipment of high-grade ore has been sacked and is awaiting transportation to San Francisco.

Tonopah Extension—The shaft has reached a depth of 975 ft., and arrangements have been completed for sending it down to 1500 ft. Developing operations are mainly on the 400-ft. level, where there is a rich pay-shoot, situated 1300 ft. west of the shaft. The ore in this shoot is from 6 to 10 ft. in width, and averages from $100 to $150 per ton. The whole ledge is 42 ft. in width, and carries ore of milling grade throughout. At present it pays to work the ore in the rich shoot only.

New Mexico

SANDOVAL COUNTY

The Jura-Trias company, with headquarters at Albuquerque, is in financial difficulty, and a receiver has recently been appointed. The mines near Nacimiento, in Triassic sandstone, have been shut down for some time, as the experiment of smelting the silicious ore alone was unsuccessful, and the long distance from the railroad rendered shipment to a custom smelter unprofitable.

SOCORRO COUNTY

A new concentrator is being erected at the Kelly mine, and the railroad switch is being extended from below Kelly to the plant. The Graphic company has been experimenting with concentration, but has not yet definitely decided to build a mill. The South Juanita is being worked by leasers. The Jacobsen interest have not yet begun work on the Juanita and Companion claims, and will probably forfeit the bonus paid for the leases.

Oregon

BAKER COUNTY

Baker Copper Belt—The opening of the south end of the Baker copper belt by the building of the line from Huntington down Snake river to Iron Dike, is creating much activity among all the copper camps along the river on both sides. The railroad will furnish an outlet for the Seven Devils mines, in Idaho, as well as the Iron Dike and other Oregon mines, which have remained dormant for years awaiting transportation.

Poorman—Workmen in this copper mine, now being developed on Goose creek, about 28 miles east of Baker City, have just opened a new body of ore, and have encountered sulphides.

Dixie Meadows—This mine and the Standard mine, on the Quartzburg camp, forty miles southwest of Baker City, are reported to have been bonded to an agent of Senator Clark, of Montana.

LANE COUNTY

Combination—This mine, in the Bohemia district, is showing up well under the management of Sherman Clark who, with his brother, R. H. Clark, has a bond on the property. This mine is developed by about 500 ft. of tunnels. The working tunnel is a crosscut, which is in 400 ft. and has cut the ledge. This ore carries much silver, also some gold. The owners expect to install machinery for the reduction of the ores, but the character of the plant has not been determined as yet. Mine is near Mineral.

Pennsylvania

ANTHRACITE COAL

Lehigh Coal and Navigation—This company will establish the headquarters of the new president, W. A. Lathrop, in Lansford instead of Philadelphia, as heretofore.

Lehigh Valley Coal Company—This company will install a compressed-air service in the Baltimore and Red Ash veins of the Maxwell colliery No. 29 at Ashley, and, as a result, about one-half of the mules now in those veins will be dispensed with. The construction work is already under way, and pipe-lines to con-

vey the compressed air are being laid. The compressing station is a brick building in which one compressor is now installed. Two larger compressors will be added to the service.

G. B. Markle & Co.—This firm has awarded a big stripping contract to F. H. Cuyle, at Harleigh; it will include the excavation of a large portion of the old Harleigh tract. The stripping will be about 600 ft. in width.

South Dakota

LAWRENCE COUNTY

Mogul—The annual report of this company, issued March 30 from the office at Pittsburg, describes the new 300-ton wet cyanide mill completed during the last year. Only 1200 tons of ore had been treated when the mill closed on account of the strike, so it was not possible to speak definitely of its success. The annual meeting will be held at Pittsburg on May 6.

Rocky Ford Oil Region—A new oil company has just been organized composed of Deadwood, Kansas, Colorado, and Manitoba men. The property adjoins that of the Wyoming-Rochford. It is expected that drilling rig will be on the ground and at work in not less than sixty days.

PENNINGTON COUNTY

Keystone Holy-Terror—The proceeding against W. F. Collins by this company to secure possession of the books and papers, was decided in favor of the company. A meeting of the stockholders will soon be called and arrangements completed for the securing of large financial interests for the company. The company will then pump out the Holy Terror, enlarge the mill and commence to operate the property on a large scale.

Bullion—A 60-day option has been given on this property to A. R. Roosevelt, of New York, representing eastern parties.

Crown—This property, in the Hornblende district, has been sold to eastern parties who have organized a stock company. James McNickle, the former owner, accepted stock in the company as part payment. This is a free milling property.

Utah

JUAB COUNTY

Utah Mine—The management of this property at Fish Springs will shortly undertake the re-timbering of the shaft which was destroyed by fire several months ago. Much difficulty has been experienced in extinguishing the blaze on the lower levels, it being necessary to haul water a distance of 2 miles. Since the disaster the company has maintained shipments and dividends by extracting ore by a horse whim from another shaft.

Tintic Smelting Company—Surveyors have completed the preliminary work at the site of the smelter to be erected in the Tintic district.

Tintic Ore Shipments—Shipments last week amounted to 141 carloads, the contributing mines and amounts being: Ajax, 4; Beck Tunnel, 7; Black Jack, 2; Bullion Beck, 3; Carisa, 1; Centennial Eureka, 51; Engle & Blue Bell, 3; Eureka Hill, 5; Gemini, 10; Godiva, 2; Grand Central, 6; Lower Mammoth, 4; Mammoth, 12; May Day, 4; Scranton, 5; Swansea, 6; South Swansea, 3; Tintic Iron, 5; Victoria, 3; Yankee Consolidated, 3; LaClede, 2 cars.

Eureka Swansea—This company, which recently underwent a change of management, will shortly begin development.

SALT LAKE COUNTY

New England Gold and Copper—The management has been greatly handicapped in getting out ore shipments on account of the railroad company failing to deliver cars. It has also been difficult to get teams to convey ore to the loading station. About eight cars of concentrate are being turned out from the mill monthly.

Bingham Mary—Ore shipments will be begun shortly. The principal developments are now being carried on on the 500-ft. level.

Wisconsin

ZINC DISTRICT

Liverpool Mining Company—This company, at Mineral Point, has been up against a hard proposition ever since it started up. The lead and jack being found disseminated in the same rock, there was considerable difficulty in the process of jigging used. It is now proposed to throw out the present jig and install the standard system which has given such highly satisfactory results; as yet nothing definite has been done. An employee of the company was recently sent to investigate the dry process but reported that it is his opinion that it is not applicable to the Wisconsin ores. The reported big strike at this mine, should it prove to be half as big as at first expected, means a great deal to the stockholders, as well as to the district in general, for it proves that the zinc ore lies at greater depth in the Mineral Point camp than at first supposed.

Canada

ALBERTA

American-Canadian Company—A large shipment of boring machinery, comprising a 40-h.p. boiler, 30-h.p. engine and 3000 ft. of drilling cable, is on the way. This will enable the company to sink to a depth of 3000 ft. The company will begin development at Egg lake, but has secured leases covering an area of 30,000 acres in the neighborhood.

NOVA SCOTIA

Dominion Coal Company—James McVey, manager at Lingan, announces that a seam of coal 6 ft. thick has been located at the proposed site of the company's new colliery. This will mean the building of a new town and the construction of 6 miles of railway.

ONTARIO—MANITOU LAKE

Victory Gold Mine—A plant, comprising two 50-h.p. boilers, a six-drill compressor and a Lidgerwood hoist, has been ordered and is now on the way to this property. On their arrival development work will be resumed.

Vermilion River Development Company—This company is engaged in dredging the Vermilion river for gold about 20 miles north of Sudbury, and has lately put in a quantity of machinery. It is also working the shore gravel and is meeting with encouraging success.

ONTARIO—LAKE OF THE WOODS

Mikado—This mine is to be re-opened, having recently changed hands. Robert H. Ahn, of Toronto, is superintending preliminary operations.

Africa

TRANSVAAL

In February the total number of stamps at work in the Transvaal was 8475, an increase of 25 over January. The number at work on the Rand was 8140, an increase of 20 stamps over January.

For the first time in many months the Simmer & Jack mine in February took second place on the list, the premier position being held by the Robinson, which turned out 21,514 oz. The production of the Simmer & Jack was 21,000 oz. As the Simmer & Jack is run by coolies, the Chinese holidays interfered somewhat with the running time. The Robinson is a Kafir mine, and therefore did not hang up during the Chinese new year.

Asia

INDIA—MYSORE

Kolar Goldfield—The gold production in March was 44,602 oz. bullion; an increase of 1378 oz. over February, but a decrease of 4438 oz. from March, 1906. For the three months ending March 31, the total was 150,590 oz. bullion in 1906, and 133,836 oz. in 1907; a decrease of 16,754 oz. The bullion reported this year was equal to 120,452 oz. fine gold, or $2,489,743 in value.

New Zealand

The Mines Department reports the exports of gold for December and the year as below, in bullion ounces:

	1905.	1906.	Changes.
December	37,951	51,649	I. 13,698
Year	520,486	563,843	I. 43,357

The bullion reported for the year 1906 was equal to 493,009 oz. fine gold, or $10,190,489 in value.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, April 17—Coal trade in the West is in fair condition, but there seems to be some tendency to over-production. The Lake trade is just opening, and promises to take an unusually large quantity of coal. The railroads are in better shape than for months past, and coal is moving freely. The demand for steam coal is good, but supplies are excessive for the time.

In the East there is nothing new. The usual spring activity is apparent, but there has been no special incident.

The lower house of the Pennsylvania legislature has passed the bill imposing a tax of 3c. per ton on anthracite coal sold. The clause providing for a tax of 1c. per ton on bituminous coal was voted out of the bill.

The retirement of David Willcox from the presidency of the Delaware & Hudson removes a prominent figure in the anthracite trade from active work. Mr. Willcox was general counsel for the company before he became its president, and was thoroughly familiar with the past history and present conditions of the trade; moreover, he was an able lawyer and pleader, and a fluent writer. He appeared on many occasions as the spokesman for the anthracite companies, and wrote pamphlets, magazine articles, etc., which were widely read, and made his name generally known to the public.

Coal-traffic Notes

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to April 6 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite	1,333,299	1,399,636	I. 66,337
Bituminous	9,727,838	9,750,220	I. 22,382
Coke	3,397,757	3,672,160	I. 274,403
Total	14,458,894	14,822,016	I. 363,122

For the first time this year an increase is shown in coal as well as in coke.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to April 13 were 299,091 tons.

Coal receipts at Boston for the three months ended March 31 are reported by the Chamber of Commerce as follows:

	1906.	1907.	Changes.
Anthracite	372,807	476,576	I. 103,769
Bituminous	762,421	653,064	D. 109,357
Total domestic	1,135,228	1,129,640	D. 5,588
Foreign coal	221,465	127,649	D. 93,816
Total	1,356,693	1,257,289	D. 99,404

The foreign coal is chiefly from Nova Scotia, though a little comes from Great Britain.

Coal shipments over the Southern Railway in January were: Tennessee district, 118,778; Alabama district, 227,065; total, 345,843 short tons.

The coal and coke tonnage of the Baltimore & Ohio Railroad for the two months ended Feb. 28 was, in short tons:

	1906.	1907.	Changes.
Anthracite	177,932	206,202	I. 28,270
Bituminous	4,265,707	4,121,526	D. 144,181
Coke	1,003,509	981,907	D. 21,602
Total	5,447,148	5,309,635	D. 137,513

The total decrease this year was 2.5 per cent.

Coal and coke shipments over the Norfolk & Western Railway for the two months ended Feb. 28 were, in short tons:

	Coal.	Coke.	Total.
To Line points	1,503,632	403,046	1,906,678
To Tidewater	283,584	28,077	311,661
Total	1,787,216	431,123	2,218,339
Total, 1906	1,842,911	428,994	2,271,905

This shows a decrease of 2.4 per cent. in the total this year.

The coal and coke traffic of various lines in western Pennsylvania for the two months ended Feb. 28 is reported as follows:

	Coal		Coke	
	1906.	1907.	1906.	1907.
Beech Crk. Div., N. Y. Cent.	1,552,160	1,180,537	16,829	13,785
Buffalo, Roch. & Pitts.	1,158,351	1,077,233	114,541	107,107
Pittsburg & L. Erie	1,960,023	1,561,237	775,310	890,193

These returns show generally a decrease in shipments.

The coal tonnage of the roads in the Ohio Coal Traffic Association for the two months ended Feb. 28 was, in short tons:

	1906.	1907.
Hocking Valley	702,303	643,098
Toledo & Ohio Central	334,004	304,182
Baltimore & Ohio	318,142	343,869
Wheeling & Lake Erie	575,622	565,542
Cleveland, Lorain & Wheeling	471,966	443,264
Zanesville & Western	226,052	228,806
Toledo Division, Penna. Co.	509,809	482,034
Lake Erie, Alliance & Wh'ling.	210,317	205,593
Marietta, Col. & Cleve.	.....	2,967
Total, net tons	3,348,215	3,219,355

The total shows a decrease of 128,860 tons, or 3.8 per cent., this year.

Coal receipts at St. Louis for the two months ended Feb. 28 were 1,516,005 short tons in 1906, and 1,403,830 tons in 1907; a decrease of 112,175 tons, or 8 per cent.

New York

Anthracite

April 17—The hard-coal market shows considerable strength and deliveries are coming forward as well as was expected. All-rail trade is receiving as much coal as can be taken care of. Small steam sizes are still scarce, but producers report that they are slowly catching up with the demand, but are not seeking new orders for these classes. Prices remain the same, as follows: Broken, $4.25; egg, stove and chestnut, $4.50; buckwheat No. 1, $2.50; pea, $3; rice, $1.85; barley, $1.50, all f.o.b. New York harbor shipping points.

Bituminous

The Atlantic seaboard soft-coal trade is dull and approaches a mid-summer condition for current business; prices are low and at the present moment there is considerable coal at New York tidewater points awaiting purchasers. This has produced a depressing effect, some of the lower grades of steam coal having been offered as low as $2.40, f.o.b. New York harbor shipping ports, with few takers. We hear of some producers of the better grades of coal curtailing shipments.

Season contract business is taking fair shipments and in this class there are but small stocks of coal on hand, especially in the far East. Contracts themselves seem to be well closed up for the coming season.

Trade in the far East is calling for fair amounts of coal, but lack of vessels is interfering with the forward movement. Along the Sound trade is dull, owing to the taking on of anthracite at April prices. New York harbor trade is quiet; little coal is offered, and there are but few takers; better grades of steam coal are quoted at $2.50@2.60. All-rail trade outside of contract business is taking little coal; the price seems to be about $1, f.o.b. mines. Transportation from mines to tide is about as scheduled but is a little irregular; car supply is generally up to demands.

In the coastwise market vessels are scarce and in demand from the lower ports; vessels in New York harbor are seeking business. We quote current rates of freight from Philadelphia to Boston, Salem and Portland, $1.10 and discharge; to the Sound, $1; to Lynn, Newburyport, Saco, and Gardiner, $1.25, and towage where usual; to Portsmouth, $1.30@1.35; to Bath, $1.15; to Bangor $1.35 per ton.

Birmingham

April 15—The production of coal in Alabama is greater right now than it has ever been in the history of the industry. Assistant State Mine Inspector James

Hillhouse, who has just returned from a trip through the coal districts, announces that the production in 1907 will be from one to two million tons greater than it was in 1906.

At the annual meeting of the Sayre Mining and Manufacturing Company, A. M. Cleaver, of South Bethlehem, Penn., was elected president; J. H. Adams, of Birmingham, vice-president, treasurer and general manager; James Weisel, Birmingham, secretary and assistant treasurer; Edwin Thomas and W. A. Lathrop, of Pennsylvania, directors. The company will increase its operations, opening new mines and constructing additional coke ovens.

Coke is in strong demand, with good prices prevailing. Some of the furnace companies are able to sell their surplus coke on the open market.

Labor is still in demand, and all applicants for positions and work are being accommodated at the collieries throughout the State.

Chicago

April 15—Sales of both bituminous and anthracite coal have been somewhat increased by the cold weather of the last week and local trade is in better condition because of a comparatively small amount of demurrage coal on tracks. Prices, especially of prepared sizes of bituminous, are stronger and in some cases accumulated stocks have been used up with profit.

Illinois and Indiana coals are selling at $2.15@2.50 for lump and egg, $1.70@2.20 for run-of-mine, and $1.25@1.75 for screenings.

Anthracite is in better demand because of the weather and the difficulty of getting forward promptly all-rail consignments.

Eastern coals are quiet. Smokeless and Hocking are firmer, the supply beng barely up to the demand. Smokeless brings $3.35 for New River and Pocahontas run-of-mine, and Hocking $3.15 for lump. Youghiogheny is a light seller, with three-quarter at $3.10. Pittsburg No. 8 is somewhat scarce and $2.85 is paid.

Cleveland

The coal market remains steady. Receipts in the city during the week past have been well regulated. Stocks are piling up, however, owing to the fact that the cold snap has deferred the opening of navigation. The Hanna and Gilchrist fleets are all loaded and will start as soon as the ice is out of the breakwater and the Soo is reported clear. The 100 boats that put in the winter here are expected to be all loaded this week, ready for clearance as soon as the lake is in shape.

Pittsburg

April 16—The market is stronger and prices have advanced about 5c. a ton, the minimum price for run-of-mine coal being $1.20 f.o.b. mine. A number of contracts have been made at $1.25. Another rise in the rivers is expected in a few days. The Monogahela River Consolidated Coal and Coke Company this week sent out a large tow of coal to the Midland Steel Company, whose plant is located about 25 miles down the Ohio river. The company has a long-term contract to supply the steel works with 250,000 tons annually. All the mines in the district are in satisfactory operation and there is a good car supply. Some heavy shipments are being made to lake ports for the northwestern trade.

Connellsville Coke—There was a further decline in spot coke prices during the week. Sales of furnace coke were made at $2.70@2.80 and foundry at $3.40@3.50. For deliveries through the last half prices are about 25c. higher. The *Courier* gives the production in the Connellsville region at 284,963 tons and in the lower region at 131,807 tons, a total for both regions of 416,770 tons. The shipments aggregated 14,168 cars, distributed as follows: To Pittsburg, 4541 cars; to points west of Connellsville, 8788 cars; to points east of Connellsville, 839 cars.

Foreign Coal Trade

April 17—Shipments of coal from Nova Scotia mines for the two months ended Feb. 28 are reported as follows, by companies:

	1906.	1907.	Changes.
Dominion	357,089	331,194	D. 25,895
N. S. Steel	66,317	64,971	D. 1,346
Cumberland	85,174	47,804	D. 37,370
Acadia	38,614	45,489	I. 6,875
Intercolonial	39,141	42,152	I. 3,011
Inverness	12,567	27,807	I. 15,240
Total	598,902	559,417	D. 39,485

The decrease this year was mainly in the shipments by the Dominion and the Cumberland companies.

The coal production of France for the full year is reported as follows, in metric tons:

	1905.	1906.	Changes.
Coal	35,218,237	33,581,685	D. 1,636,552
Lignite	709,467	731,960	I. 22,493
Total	35,927,704	34,313,645	D. 1,614,059

The total decrease was 4.5 per cent. The heaviest loss was 2,016,039 tons in the Nord and Pas-de-Calais, which produce about 60 per cent. of the total.

Exports of coal from Germany for the two months were as follows:

	1906.	1907.	Changes.
Coal	3,765,488	3,144,419	D. 621,069
Brown coal	3,364	2,696	D. 668
Total	3,768,852	3,147,115	D. 621,737

Exports of coke for the two months in 1907 were 583,940 tons; of briquets, 192,765 tons; of peat briquets, 1147 tons. Included in the coke exports were 295 tons to the United States.

Coal production in Germany for the two months ended Feb. 28 is reported as follows, in metric tons:

	1906.	1907.	Changes.
Coal	22,800,826	23,468,045	I. 667,219
Brown coal	9,601,927	9,902,808	I. 300,881
Total mined	32,402,753	33,370,853	I. 968,100
Coke made	3,141,593	3,424,881	I. 283,288
Briquets made	2,441,817	2,468,225	I. 26,408

Production continues to show a good increase this year, as it did nearly all through last year. The larger part of the briquets is made from brown coal or lignite.

Imports of coal in Germany for the two months ended Feb. 28 were, in metric tons:

	1906.	1907.	Changes.
Coal	1,291,360	1,570,267	I. 278,907
Brown coal	1,260,694	1,237,226	D. 23,468
Total	2,552,054	2,807,493	I. 255,439

Imports of coke for the two months in 1907 were 52,250 tons; of briquets, 22,347 tons; of peat briquets, 1917 tons.

The coal bunkered, or supplied to steamships engaged in foreign trade, at United States ports for the two months ended Feb. 28 was 910,037 tons. Adding this to the exports previously reported makes a total of 2,359,489 tons sold for consumption beyond the limits of the United States.

Iron Trade Review

New York, April 17—The recent activity in bessemer pig has been supplemented in the past week by some heavy buying of foundry iron, several large concerns having been in the market for supplies for the second half of the year. There has also been more buying of finished material, notably of structural steel. While some railroad orders are held back, building operations seem to be going on actively, and there is less of the hesitancy to order manifest than was the case early in the month.

Open-hearth Steel—The American Iron and Steel Association reports the production of open-hearth steel in the United States for the past year as below, in long tons:

	1905.	1906.	Changes.
Acid	1,155,648	1,321,613	I. 165,965
Basic	7,815,728	9,649,385	I. 1,833,657
Total	8,971,376	10,970,998	I. 1,999,622

The total increase was 22.2 per cent.; the gain in acid steel being 14.4, and in basic 23.5 per cent. The proportion of basic steel to the total rose from 87.1 in 1905, to 87.9 per cent. last year. Included in the total for 1906 are 713,157 tons of direct castings.

Pig Iron Production—On April 1 there were 313 coke and anthracite furnaces reported in blast, their aggregate weekly capacity being 497,500 tons. This is 13,500 tons less than the total reported on March 1. Taking the estimate of the *Iron Age* for the coke and anthracite stacks, and adding an allowance for the charcoal furnaces, the production of pig iron in March was, approximately, 2,260,500 tons; for the three months ended March 31 it was 6,579,100 tons. Of this 4,150,000 tons, or

about 63 per cent., was made by the furnaces belonging to the larger steel companies.

Baltimore

April 16—Imports of spiegeleisen for the week were 3835 tons; of ferromanganese, 2184 tons; of ferrosilicon, 135 casks. Receipts of iron ore for the week were 5350 tons from Cuba, 6600 tons from Spain, and 7700 tons from Beni-saf, Algeria; a total of 19,650 tons. Other receipts included 2910 tons copper ore from Cuba.

Included in the exports were 2457 tons steel rails, and 142 tons splice-bars to Mexico.

Birmingham

April 15—Pig-iron transactions in Alabama for delivery during the last quarter of the year are quite numerous. Spot iron in any quantity is still out of the question. What little can be obtained readily brings $22@23 per ton, No. 2 foundry. Fourth-quarter iron is strong at $18.50@19, No. 2 foundry. The railroads continue to supply cars with which to move the product. The production in Alabama is still off, with no prospects of an immediate improvement. Furnace repairing is being pushed, but the work is slow.

Development in the iron-ore mines, both brown and red ore, is still very active and the preparations started a short time since to increase the raw material will soon be bearing fruit.

Among others visiting the Birmingham district during the past week was M. Asabuki, a Japanese representative of a large commission house with office in New York. He visited the steel and iron plants of the Tennessee Coal, Iron and Railroad Company, in the Birmingham district.

Chicago

April 15—The iron market continues firm but quiet. There are no indications of a speedy change one way or the other. Contracts are not for large amounts, nor are they numerous, on second-half business. Southern runs $18.50@19, Birmingham, making the Chicago quotations $22.75@23.35. For the months of April, May and June, Southern runs $21.50@22, Birmingham, or $25.85@26.35 Chicago. Northern is scarce for early deliveries and brings about $26.50. Lake Superior charcoal is in good demand at $26.50@27.

Sales of iron and steel products are good. The reconstruction of the Chicago street railways will use much material, particularly rails. Structural material is in especially strong demand.

Cleveland

April 16—The local iron market shows little change this week. Spot shipments are still in strong demand and $26.25 is asked for Northern No. 1 foundry. Bessemer is quoted at $24.85 by a large producer. The Cleveland Furnace Company is still out of blast and will not be running until next week. Most business is for last-half delivery, with prices quoted as follows: Bessemer, $21.85; No. 1 foundry, $22.50; No. 2 foundry, $22; No. 3 foundry, $21.50; No. 2 Southern, $22.85; gray forge, $20@20.50.

A fair demand exists for coke, with a normal supply on track here. Prices are without change from last week. An important deal has just been completed by which F. M. Osborne, of this city, and J. R. Nutt, secretary of the Citizens Savings and Trust Company, have financed the Tower Hill Connellsville Coke Company, owning 2000 acres of coking coal in West Virginia. A mortgage has been filed with the Citizens Savings and Trust Company and $2,500,000 five per cent. bonds will immediately be issued.

Philadelphia

April 17—So far as the pig-iron market in this territory is concerned there have been few heavy transactions and the best information available does not point to any material increase in demand. There are a few large consumers who would buy liberally for third- and fourth-quarter deliveries, if what they regard as sufficient inducement were offered; but they will not move out of their tracks while iron remains at its present quotation for late delivery. There is a little unsettled feeling on account of reported large transactions in outside territory involving concessions in prices. So far as the smaller class of buyers is concerned, prices are firm, demand is moderate, consumption is heavy and a larger demand is probable during the early summer on account of the new work now in sight. Quotations are wabbling slightly; basic iron is not selling; buyers are looking abroad for iron for summer delivery, but may not be obliged to purchase there if domestic conditions work out as they think they will. Quotations for early delivery are: Middlesboro on dock $21.50; basic nominally $24; mill iron $22.50@23; No. 2 foundry $24.50.

Scrap—The scrap dealers have succeeded in lately accumulating a great deal of stock. No. 1 steel scrap is wanted at about $18.50; railroad scrap is pretty well cleaned up and some dealers hold at $21. No. 1 yard scrap is in fair supply at $18.50 per ton.

Pittsburg

April 16—There is no material change in the iron and steel markets. Despite the crowded condition of the mills, new business is still being booked in all of the finished lines. Although records of production are being broken at most of the plants in this district, unfilled orders are greater than ever. It was learned today that the National Tube Company, which recently withdrew quotations, cannot promise deliveries on new business before Oct. 1. It is still receiving orders for various tonnages subject to the new prices to be named on June 1, and for deliveries whenever they can be made. The spread between steel and wrought-iron pipe has increased, and sales of iron pipe this week were at from $12 to $14 a ton higher than the maximum price quoted by the Youngstown Sheet and Tube Company, the leading independent producer, for steel pipe. There has been no change in sheets. The American Sheet and Tin Plate Company has not been able to catch up on deliveries, and is still about six months behind. The American Bridge Company closed about 100,000 tons of structural material last week, over 20,000 tons being placed in this district. One large steel interest is sold up for eight months on merchant steel bars, and during the week was forced to reject a large tonnage offered on which a premium would have been paid.

Pig Iron—In addition to the sales of bessemer pig iron recorded last week for delivery in the second quarter, contracts aggregating about 15,000 tons were closed at prices ranging from $22.50 to $23, Valley furnaces. Later in the week two large steel interests entered the market for the second half. The reports of the purchases at first made public were greatly exaggerated, the purpose evidently being to stimulate the market. Instead of sales aggregating 250,000 tons, the exact total was 192,000 tons. Of this tonnage the Bessemer Pig Iron Association sold 120,000, and the United Iron and Steel Company, which took over the properties of the Cherry Valley Iron Company, 12,000 tons, to the Youngstown Sheet and Tube Company. The Cambria Steel Company bought 60,000 tons from W. P. Snyder & Co., the price to be on the ascertained monthly average. The other sales were at $21, Valley furnaces, and it is reported, but not officially, that this rate is guaranteed against a decline. This week some important inquiries have been received for late delivery, and several additional sales may be recorded before the end of the week. The demand for spot foundry iron is more active, and No. 2 foundry continues to be held firmly at $25@25.50, Valley furnaces. Gray forge also is in greater demand, and the price is a trifle higher, the minimum being $21.85, Pittsburg.

Steel—Billets continue scarce and quotations of $30.50 for bessemer, and $31.50 for open-hearth are nominal. Steel-bar contracts that expired on April 1 are being renewed at 1.60c. The regular mill price for plates remains at 1.70c., but premiums are paid for early delivery.

Sheets—The situation is about the same as a week ago. Mills cannot promise deliveries inside of five or six months. Prices are unchanged at 2.60c. for black and 3.75c. for galvanized sheets No. 28 gage.

Ferro-Manganese—The market is weaker and for prompt delivery $72 to $73 is quoted.

BY TELEGRAPH

Pittsburg, April 17—Sales are reported of 5000 tons basic and 2500 tons bessemer pig, fourth-quarter delivery, at $21, Valley, to a consumer who recently covered for third quarter at the same price.

London

April 8—The British Iron Trade Association reports the production of steel in Great Britain for the past year as below, in long tons:

	1905.	1906.	Changes.
Bessemer	1,974,210	1,907,338	D. 66,872
Open-hearth	3,838,072	4,554,936	I. 716,864
Total	5,812,282	6,462,274	I. 649,992

The decrease in bessemer was 3.4 per cent.; but the gain in open-hearth was 18.7 per cent., making an increase of 11.2 per cent. in the total make. The proportion of open-hearth steel to the total rose from 66 per cent. in 1905 to 70.5 in 1906. The ratio of steel to pig iron was 63.7 last year. There was an average of 56 converters and 419 open-hearth furnaces at work in 1906; showing average yearly outputs of 34,060 tons per converter and 10,871 tons per furnace.

The division of steel made by the acid and basic processes was as follows in 1906:

	Acid.	Basic.	Total.
Bessemer	1,307,149	600,189	1,907,338
Open-hearth	3,378,691	1,176,245	4,554,936
Total	4,685,840	1,776,434	6,462,274
Total, 1905	4,439,067	1,373,215	5,812,282

The proportion of acid steel to the total was 76.4 per cent., in 1905; falling to 72.5 per cent. last year.

The production of finished steel forms is not completely given; so far as the figures go, the forms in which the steel was sold in 1906 were as follows:

	Open-hearth.	Bessemer.	Total.
Blooms and billets	498,656	277,845	776,501
Rails	94,626	854,740	949,366
Bars	939,087	242,706	1,181,793
Plates and sheets	1,734,446	.....	1,734,446
Structural shapes	198,389	.....	198,389
Merchant steel	.....	82,246	82,246
Total	3,465,204	1,457,537	4,922,741

The balance of the ingots is accounted for by loss in manufacture, and by production of tires, forgings, and some other forms not reported.

Dusseldorf, Germany

April 6—The German Iron and Steel Union reports the production of steel in Germany for the full year as follows, in metric tons:

	Acid.	Basic.	Total.
Converter	407,688	6,772,804	7,180,492
Open-hearth	230,668	3 534,612	3,765,280
Special steels	77,596	111,717	189,313
Total	715,952	10,419,133	11,135,085
Total, 1905	655,495	9,411,058	10,066,553

The increase in acid steel was 60,457 tons; in basic steel, 1,008,075 tons; total gain, 1,068,532 tons, or 10.6 per cent. Of the total steel made 93.6 per cent. was basic, and 6.4 per cent. acid. Converter steel was 64.5 per cent. of the total; open-hearth, 33.8; special steel, 1.7 per cent. Germany retains its strong preference for the basic converter. The ratio of steel to pig-iron production was 89.2 last year.

The output of the German blast furnaces in February was 978,191 metric tons of pig iron, being 83,961 tons less than in January. This was due to the shorter month; the daily average was 34,263 tons in January and 34,935 tons in February, showing an increase of 672 tons. For the two months ended Feb. 28 the total was as follows, in metric tons:

	Tons.	Per Ct.	Tons.	Per Ct.
Foundry iron	329,218	16.8	343,605	16.8
Forge iron	136,120	7.0	132,352	6.5
Steel pig	154,068	7.9	161,238	7.9
Bessemer pig	72,889	3.7	77,558	3.8
Thomas pig	1,264,600	64.6	1,325,590	65.0
Total	1,956,895	100.0	2,040,343	100.0

The increase in foundry iron was 14,387 tons; in steel pig, 7170; in bessemer pig, 4669; in Thomas pig, 60,990 tons. There was a decrease of 3768 tons in forge iron, leaving the total gain 83,448 tons, or 4.3 per cent.

Metal Market

NEW YORK, April 17

Gold and Silver Exports and Imports

At all United States Ports in March and year

Metal.	Exports.	Imports.	Excess.
Gold:			
Mar. 1907	$2,126,173	$ 5,007,319	Imp. $2,881,146
" 1906	5,918,627	5,630,695	Exp. 287,932
Year 1907	5,703,304	11,607,691	Imp. 5,904,387
" 1906	20,146,622	10,316,087	Exp. 9,830,535
Silver:			
Mar. 1907	5,058,461	3,936,139	Exp. 1,122,322
" 1906	5,213,811	3,509,838	" 1,703,973
Year 1907	14,669,396	11,315,168	" 3,354,228
" 1906	19,165,608	12,676,998	" 6,488,610

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York

For week ending Apr. 13 and years from Jan. 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	.....	$ 431,557	$ 872,445	$ 14,826
1907	$1,756,336	5,038,785	10,847,419	634,182
1906	3,674,526	4,315,183	20,278,173	579,740
1905	31,950,770	4,184,040	10,037,998	1,114,675

Exports of silver for the week were to London; there were no exports of gold. Imports of gold for the week were from London and the West Indies; of silver from the West Indies and Mexico.

The foreign trade of the United States for the three months ended March 31 is valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.
Exports, merch'dise	$457,870,318	$511,504,265
Imports	324,351,981	382,917,669
Excess, exports	$133,518,337	$128,586.596
Add excess of exports, silver		3,354,228
Total		$131.940,824
Deduct excess of imports, gold		5,904,387
Total export balance		$126,036 437

The gold and silver movement in detail will be found in the table at the head of this column.

The joint statement of all the banks in the New York Clearing House for the week ending April 13 shows loans $1,099,657,100, an increase of $36,968,300; deposits, $1,081,661,900, an increase of $44,948,800, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie	$172,704,700	$212,966,300
Legal tenders	77,533,200	73,302,100
Total cash	$250.237,900	$286,268,400
Surplus	$ 4,772,500	$ 15,852,925

The surplus over legal requirements shows an increase of $6,411,700, as compared with the previous week this year.

Specie holdings of the leading banks of the world, April 13, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$212,966,300
England	$177,283.220	.....	177,283,220
France	516.835,100	$195,437,760	712,272,860
Germany	153,805,000	51,270,000	205,035,000
Spain	77,235,000	125,450,000	202,685,000
Netherlands	25,740.500	28,140,000	53,880,500
Belgium	16,750,000	8,375,000	25,125,000
Italy	161,675,000	25,486,000	187,161,000
Russia	597,635,000	29,440,000	627,075,000
Aust.-Hungary	225,860,000	61,920,000	287,780,000
Sweden	20,765,000	.....	20,765,000

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Pixley & Abell as follows, for the year to April 4:

	1906.	1907.	Changes.
India	£ 5,371 960	£4,043,558	D. £ 1,328,402
China	.....	.....	.....
Straits	.....	172,550	I. 172,550
Total	£ 5,371,960	£4.216,108	D. £ 1.155 852

Receipts for the week were £3000 from the West Indies and £116,000 from New York; £119,000 in all. Exports were £136,148, all to India.

Indian exchange continues steady, all the Council bills offered in London being taken at an average of 16.09d. per rupee. There have been lighter shipments of silver to India. Sales of silver in London on Chinese account continue to be made.

The movement of gold and silver in France for the two months ended Feb. 28 is reported as follows:

	1906.	1907.
Gold:		
Imports	Fr. 94,316,000	Fr. 22,794,000
Exports	7,476,000	35,323,000
Excess	I. Fr.86,840,000	E. Fr.12,529,000
Silver:		
Imports	25,190,000	28,742,000
Exports	29,317,000	16,037,000
Excess	E. Fr. 4,127,000	I.Fr.12,705,000

Imports of nickel and copper coins were 17,000 ft. in 1906, and 19,000 fr. in 1907. Exports were 65,000 ft. in 1906, and 11,000 fr. in 1907. The gold exports this year exceeded the imports, an unusual condition.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.50¼	$0.53
Peruvian soles and Chilean	0.45¼	0.47¼
Victoria sovereigns	4.85	4.87
Twenty francs	3.85	3.89
Spanish 25 pesetas	4.78½	4.80

SILVER AND STERLING EXCHANGE.

April.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	April.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
11	4.85¾	65⅛	30⅛	15	4.85¼	66	30½
12	4.85¼	65⅛	30⅛	16	4.85¼	65⅛	30⅛
13	4.85½	65⅞	30⅛	17	4.85½	65⅜	30¼

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

Daily Prices of Metals in New York.

April.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
11	25 @25⅛	23¾ @24¼	98¼	40⅝	6.00	6.65 @6.75	6.50 @6.60
12	25 @25⅛	23¾ @24¼	94⅞	40⅜	6.00	6.65 @6.75	6.50 @6.60
13	25 @25⅛	23¾ @24¼	.....	40⅛	6.00	6.65 @6.75	6.50 @6.60
15	25 @25⅛	23¾ @24¼	94⅜	40¼	6.00	6.65 @6.75	6.50 @6.60
16	25 @25⅛	24 @24¼	96½	40¼	6.00	6.65 @6.75	6.50 @6.60
17	25 @25½	24 @24¼	98⅝	40¼	6.00	6.65 @6.75	6.50 @6.60

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotation on spelter are for ordinary western brands; special brands command a premium.

Copper—The situation reported in our last week's issue as being brought about by the disparity between the foreign and domestic markets is still the dominant influence. Business was stagnant up to the beginning of this week, but the lower prices established have at last attracted some buyers and fair-sized quantities have changed hands during the last few days. With this development of business, and the improvement in London, there is a stronger tone, though the market is still rather uncertain, and with peculiar features. In Lake there has been but little business and the situation remains unchanged. The interests which have been holding out for 25c. for electrolytic are as firm as ever in their position, and one sale of some size is reported to have been made at that price, but others have offered and made sales at the same time at 24c., and even lower. However, at the close the market displays a firmer tendency, and we quote as the average 25@25½c. for Lake, 24@24¼c. for electrolytic, and 22½@23c. for casting.

After declining to about £94 from the high prices which ruled at the close of last week, the London market has gradually advanced from day to day under an aggressive buying movement, and closes firm at £98 12s. 6d. for both spot and three months'.

Statistics for the first half of the current month show a decrease in the visible supplies of 1200 tons.

Refined and manufactured sorts we quote: English tough, £108@109; best selected, £109@110; strong sheets, £118.

Exports of copper from New York and Philadelphia for the week were 1061 long tons. Our special correspondent reports the exports from Baltimore at 938 long tons fine copper. The Baltimore exports also included 168,470 lb. copper sulphate.

Imports and exports of copper in Germany for the two months ended Feb. 28 were, in metric tons:

	1906.	1907.	Changes.
Imports	22,770	17,294	D. 5,476
Exports	2,509	1,250	D. 1,259
Net imports	20,261	16,044	D. 4,217

This shows a decrease of 20.8 per cent. in the net imports this year.

Copper Sheets—The base price of copper sheets is 32c. per pound.

Copper Wire—The base price of copper wire, No. 0000 to No. 8, is 27¼@27½c. per pound.

Tin—There has been no decided tendency to the market, London having fluctuated within narrow limits, the close being £185 2s. 6d. for spot, £183 2s. 6d. for three months'. Business here is still of hand-to-mouth proportions, transactions taking place at about 40¼c.

Exports of tin from the Straits for the month of January were, in long tons:

	1906.	1907.	Changes.
United States	2,156	1,278	D. 878
Great Britain	3,126	2,867	D. 259
Other Europe	715	525	D. 190
China and India	78	199	I. 121
Total	6,075	4,869	D. 1,206

A considerable part of the shipments to Great Britain is of metal in transit to the United States.

Lead—The market is unchanged at 6c., New York.

The London market has been very firm and a great scarcity is reported in spot supplies. The close is higher at £20 2s. 6d. for Spanish lead, £20 5s. for English lead.

St. Louis Lead Market—The John Wahl Commission Company reports as follows: Lead is dull but steady, at 5.92½c. for all brands

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 6, that the price of lead has been 91.50 reales per quintal, silver being paid for at 13.75 reales per ounce; exchange, 27.91 pesetas to £1. The price, on current exchange, is equal to £18 7s. per long ton, f.o.b. Cartagena. Exports for the week were 600 tons desilverized, and 1146 tons argentiferous lead to Great Britain; 198 tons argentiferous and 942 tons desilverized lead to Marseilles; 2886 tons in all.

Spelter—Consumers, being well supplied, have been holding off in view of the declining tendency of the market. Near-by deliveries are holding their own, while futures are being pressed for sale at quite a discount. The market closes easy at 6.65@6.75, New York; 6.50@6.60, St. Louis.

The London market is also somewhat weaker, and prices have declined at the close to £25 10s. for good ordinaries, £25 15s. for specials.

Zinc Sheets—The base price is now $8.60 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 pounds.

Zinc Dust—Paul Speier reports that the latest quotations, for prompt delivery, in lots of 10 tons or over, is 50.25@50.50 marks per 100 kg.—equal to 5.44 per lb.—packing included, f.o.b. Stettin, Germany.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 6 that the market remains quiet. Shipments for the week were 1300 tons blende to Stettin; 6985 tons blende and calamine to Antwerp; 8285 tons in all.

Antimony—The market is dull and uninteresting. Quotations are: Cookson's, 24@25c.; Hallett's, 21¾@22½c.; ordinaries, 21½@22c.

Nickel—For large lots, New York or other parallel delivery, the chief producer quotes 45@50c. per lb., according to size and terms of order. For small quantities prices are 50@65c., same delivery.

Platinum—The market has fluctuated rather sharply and prices are a little uncertain. The latest quotation is $32@32.50 per ounce for ordinary metal; $35 for hard. Scrap is quoted at $25 per ounce.

Quicksilver—Current prices in New York are $41 per flask of 75 lb. for large quantities and $42 for smaller orders. San Francisco orders are $38@39 per flask, according to quantities, for domestic orders, and $37@37.50 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

Aluminum—All price lists on this metal have been withdrawn. Most of the business at present is in deliveries on contract, and the metal is only to be had for early delivery from second hands. Prices are entirely nominal, at 48@50c. per lb.

for No. 1 ingots, and 47@49c. for No. 2 metal.

Cadmium—Paul Speier writes, from Breslau, Germany: Demand has been good recently. The current quotation for cadmium metal, 99.5 per cent. pure, is 12.75@13.25 marks per kilogram—average $1.40 per lb.—packing included, f.o.b. Hamburg.

New York Metal Exchange—The following standing committees have been appointed for the ensuing year: Executive, B. Hochschild, H. W. Hendricks, William Jay Ives; finance, B. Hochschild, George W. Jaques, G. E. Behr; law, William Jay Ives, G. E. Behr, Robert L. Crooke; floor, J. H. Lang, George W. Jaques, C. Mayer; warehouse, G. E. Behr, C. H. Bolles, Jr., J. H. Lang, Robert Gentle, Henry I. Stetler; trade, B. Hochschild, L. Nachmann, E. A. Caswell, L. Vogelstein, C. Mayer; pig iron, B. Nicoll, James E. Pope, A. A. Fowler; pig tin, J. H. Lang, E. A. Caswell, P. Koning; copper, B. Hochschild, L. Vogelstein, John R. Stanton; lead, R. L. Crooke, E. A. Caswell, J. H. Lang; spelter, G. E. Behr, J. Langeloth, L. Vogelstein; quotations, B. Hochschild, L. Vogelstein, P. Koning, J. H. Lang, Edwin Groves.

Wisconsin Ore Market

Platteville, Wis., April 13—According to the view of many of the producers here the buyers are pursuing the only policy possible when all the local conditions are taken into consideration. Sixty per cent. ore sold off a little from last week, although in some cases a higher price was paid. Nearly all interested in zinc mining are formulating their plans along broader lines than formerly, thus showing confidence in the future of the district. Particular attention is being paid to the improvement of roads, so as to facilitate hauling to shipping points.

Medium- and low-grade ores continue in strong demand and nearly all the surplus has been loaded and shipped. Lead is steady, with practically no change in price reported, the same being true with dry bone and sulphur.

The shipment for the district, by camps, for the week were as follows, in pounds:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	142,800	.....	.....
Hazel Green	1,026,600	.....	.....
Benton	234,490	.....	.....
Cuba City	75,000	55,220	.....
Rewey	60,000	.....	.....
Livingston	60,000	.....	.....
Galena	83,600	.....	.....
Mineral Point	47,640	.....	.....
Harker	64,910	.....	.....
Highland	132,000	44,470	.....
Linden	170,490	.....	.....
Total for week	2,097,530	99,690	.....
Year to April 13	25,034,479	1,132,190	143,160

The Buncombe-Hazel Green camp has taken the lead in the way of production, this being due to the starting up of two new plants.

Missouri Ore Market

Joplin, Mo., April 13—The highest price paid for zinc was $53 per ton, on an assay basis of $48@50 per ton of 60 per cent. zinc, averaging $48.06 per ton. The highest price for lead was $82 per ton, with an average of $79.88. Compared with a year ago both zinc and lead are $4 per ton higher.

More active competition during the two past weeks has caused the purchase of all but approximately 2000 tons of the reserve stock of zinc in the bins. Buyers report the market easy, indicating that sellers are accepting offers freely. There is no disposition to curb prices, but producers are a unit in expecting a reaction that will send ore prices higher than any point reached this year.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,041,980	376,510	$91,109
Webb City-Carterville	2,371,820	764,150	89,861
Galena-Empire	1,346,670	178,230	40,122
Badger	1,088,070	11,720	28,758
Alba-Neck City	838,520	8,420	21,718
Duenweg	333,200	181,290	15,581
Prosperity	250,420	223,500	15,200
Spurgeon	435,920	158,610	14,473
Granby	595,000	61,000	12,500
Oronogo	478,670	.....	10,787
Baxter Springs	196,100	88,910	8,262
Aurora	404 820	17,830	7,863
Springfield	123,230	.....	3,019
Sherwood	55,030	12,070	1,802
Zincite	69,390	2,910	1,781
Carl Junction	54,480	5,880	1,542
Peoria	65,840	.....	1,524
Cave Springs	51,590	.....	1,264
Stott City	51,000	.....	1,224
Sarcoxie	44,110	.....	1,058
Totals	11,895,860	2,091,030	$369,448
15 weeks	179,496,140	27,918,920	$5,424,108

Zinc value, the week, $285,929; 15 weeks, $4,266,043
Lead value, the week, 83,519; 15 weeks, 1,158,065

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.53
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	.....	April	75.13	.....
May	40.51	.....	May	78.40	.....
June	43.83	.....	June	80.96	.....
July	43.25	.....	July	74.31	.....
August	43.56	.....	August	75.36	.....
September	42.58	.....	September	79.64	.....
October	41.55	.....	October	79.84	.....
November	44.13	.....	November	81.98	.....
December	43.68	.....	December	81.89	.....
Year	43.24	.....	Year	77.40	.....

Chemicals

New York, April 17—The chemical trade is generally active; demand for alkalies and bleach is good and prices firm.

Copper Sulphate—Demand is fully up to supply. There is no change in prices, and we continue to quote $7.50 per 100 lb. for carload lots, or over; $7.75 per 100 lb. for smaller parcels.

Nitrate of Soda—There is rather a shortage of supplies, while the demand continues good. Spot prices are quoted at $2.70 per 100 lb., with 96 per cent. for all positions of 1907 at $2.50. The price for 95 per cent. salts is $2.45, for both 1907 and 1908.

Mining Stocks

New York, April 17—The stock markets generally are still heavy, with business dragging on small fluctuations, and a downward tendency. Outside buying is not much in evidence. The curb market, in which most mining stocks are sold, was a little better than the exchange, and showed a fair amount of trading, with little loss in prices.

Boston

April 16—Mining stocks closed with a good tone tonight, although they are considerably below the level of a week ago. It is hardly expected that any increase in the Amalgamated dividend will take place and even then this stock, as well as many others, are selling at near a 10 per cent. basis.

Amalgamated, during the week, broke $6.37½ to $89.87½, with recovery to $93.50 tonight. Copper Range slid back $3.25 to $78.75, but is above $81 tonight. This company announces that it will increase its capital 15,000 shares May 1, to an even 400,000 shares, using 10,000 shares of the increase to acquire the Globe mining property, now under option, adjoining the Champion on the north. North Butte went off $6.75 to $85.50, recovering but $1 of the decline. The annual report was somewhat disappointing, showing an extraordinary expense for the year ended March 31. Net earnings were $3,637,209, equal to but $9 per share. Total expenditures were $3,081,513, with an output of 32,865,907 lb. of copper, at a cost of 9.4c. per pound. New properties have been acquired, which explains partially the increase in operating cost. Butte Coalition fell from $27 to $24.87½, with less than $1 recovery.

Calumet & Hecla touched $800, which is 20 per cent. below the price touched in the boom, when it sold for $1,000 per share. Old Dominion has shown rapid gyrations within short periods, the price varying from $55 to close to $50, with the final tonight $53.50. Net earnings of the New Jersey company for March are reported as over $250,000. This company will soon be free from debt. Osceola broke $8 to to $133. The annual meeting, adjourned until today, has again been postponed until May 6. It now looks as if the Calumet & Hecla people, through the court ruling, might be able to elect their board at that time.

The Tamarack Mining Company will consider the sale of 5906 acres of timber land at its annual meeting May 2. In ad-

dition to the offering of 100,000 shares of Balaklala stock to holders the company has also sold 25,000 shares privately at $10, less an underwriting commission of 50c. per share.

Colorado Springs

April 13—Trading on the local mining exchange has been decidedly dull during the week, and prices have been noticeably off color. Elkton has shown some activity which was caused by the buyers taking advantage of the sharp decline in the price of this stock. The balance of the list has been weak. Although work on the drainage tunnel is progressing, it seems to have no effect on the stock market.

STOCK QUOTATIONS

NEW YORK	Apr. 16
Name of Comp.	Clg.
Alaska Mine	1¼
Am.Nev.M.&P.Co.	3⅛
Amalgamated	93⅝
Anaconda	61¼
Balaklala	10⅛
British Col. Cop.	8
Buffalo Cobalt	2⅛
Butte & London	2
Butte Coalition*	25¼
Butte Cop. & Zinc	5¾
Cobalt Contact	⅛
Colonial Silver	3⅜
Cum. Ely Mining	8⅞
Davis Daly	12½
Dominion Cop.	5⅜
El Rayo	6
Foster Cobalt	1⅞
Furnace Creek	1¼
Giroux Mine	9⅛
Gold Hill	1⅞
Granby, New	15
Greene Gold	1⅝
Greene G. & S	1⅝
Greenw'r & D.Val.	107
Guanajuato	4
Guggen. Exp.	230
Hanapah	⅛
McKinley Dar.	1⅞
Micmac	4⅜
Mines Co. of Am.	1⅜
Mitchell Mining	3¾
Mont.Sho. C.(New)	10¾
Nev. Utah M. & S.	4
Newhouse M. & S.	20
Nipissing Mines	12¾
Old Hundred	3½
Silver Queen	1⅞
Stewart	2⅜
Tennessee Copper	...
Union Copper	¾
Utah Apex	5¾
West Columbus	11

N. Y. INDUSTRIAL	
Am. Agri. Chem.	...
Am. Smelt. & Ref.	130⅛
Am. Sm. & Ref., pf.	106½
Bethlehem Steel	...
Colo. Fuel & Iron	35⅛
Federal M. & S., pf.	85
Inter. Salt	15⅛
National Lead	60¾
National Lead, pf.	98½
Pittsburg Coal	...
Republic I. & S.	29½
Republic I. & S., pf.	85
Sloss-Sheffield	...
Standard Oil	547
Tenn. C. & I.	144⅞
U. S. Red. & Ref.	...
U. S. Steel	37½
U. S. Steel, pf.	100¾
Va. Car. Chem.	28½
Va. I. Coal & Coke	73

ST. LOUIS	Apr. 13	
N. of Com.	High.	Low.
Adams	.40	.25
Am. Nettie	.08	.06
Center Cr'k	2.15	1.80
Cent. C. & C.	65.00	63.50
C.C. & C. pd.	80.00	78.00
Cent. Oil	125.00	110.00
Columbia	5.00	4.50
Con. Coal	27.25	25.00
Doe Run	170.00	150.00
Gar. Bimet.	.30	.20
St. Joe	17.00	16.00

BOSTON	Apr. 16
Name of Comp.	Clg.
Adventure	....
Allouez	51
Am. Zinc	39
Arcadian	6
Atlantic	13
Bingham	17⅛
Boston Con.	24⅜
Calumet & Ariz.*	156
Calumet & Hecla*	820
Centennial	30
Con. Mercur	....
Copper Range	81¼
Daly-West	16
Franklin	16½
Greene—Can. ctfs.	16
Isle Royal	17¾
La Salle	16
Mass.	....
Michigan	14¼
Mohawk	76¼
Mont. C. & C.(new)	....
Nevada	....
North Butte	86¼
Old Colony	....
Old Dominion	53¼
Osceola	...
Parrot	21
Phoenix	1½
Quincy*	118
Rhode Island	....
Santa Fe	3⅛
Shannon	17¾
Tamarack*	106
Trinity	20¾
United Cop., com.	60
U. S. Oil	10⅛
U. S. Smg. & Ref.	53¾
U.S.Sm.& Re.,pd *	44
Utah Copper	61¾
Victoria	7½
Washington	...
Winona	8
Wolverine	150
Wyandotte	....

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	....
Ariz. Com.	24½
Black Mt.	5⅞
Cananea Cent.	27
East Butte	10¼
Hancock Con.	....
Keweenaw	10
Majestic	3¼
Raven	1⅞
Shawmut	.75
Superior	....
Superior & Pitts.	17⅛
Troy Man	2

LONDON	Apr. 17
Name of Com.	Clg.
Dolores	£1 12s 6d
Stratton'sInd.	0 3 6
Camp Bird	1 3 6
Esperanza	2 3 9
Tomboy	1 7 6
El Oro	1 7 6
Oroville	0 17 0
Somera	0 6 3
Utah Apex	1 6 3
Ariz.Cop.,pfd.	3 15 0
Ariz.Cop.,def.	3 12 6

Cabled through Hayden, Stone & Co., N. Y.

S. FRANCISCO	Apr. 10
Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	.45
Best & Belcher	1.40
Caledonia	.47
Challar	.12
Con. Cal. & Va.	1.10
Crown Point	.34
Exchequer	.80
Gould & Curry	.39
Hale & Norcross	.87
Mexican	.97
Ophir	2.45
Overman	.18
Potosi	.13
Savage	.99
Sierra Nevada	.63
Union	.65
Utah	.06
Yellow Jacket	....
TONOPAH STOCKS	
Golden Anchor	.35
McNamara	.49
Montana-Pitts.ex.	.20
North Star	.30
Rescue	.17
GOLDFI'D STOCKS	
Black Ants	.12
Blue Bull	.47
Columbia Mt.	.93
Comb. Frac.	4.90
Conquerer	.22
Daisy	2.35
Florence	5.50
Frances-Mohawk	1.10
Goldfield Con.	8.62
Grandma	.28
Great Bend	1.12
Red Hills	.43
St. Ives	1.70
BULLFROG STOCKS	
Amethyst	.49
Bonnie Claire	.45
Mayflower Con.	.43
Montgomery Mt.	.25
Original	.15
MANHAT'N STOCKS	
Gold Wedge	.10
Manhattan Mg.	.13
Pine Nut	.19
Ruby Wonder	....
Stray Dog	.30
Yellow Horse	.09

NEVADA (Weir Bros. & Co., New York)	Apr. 17
TONOPAH STOCKS	Clg.
Tono'h Mine of N.	18.12½
Tonopah Exten.	3.75
Montana Tonop'h	3.65
Belmont	4.50
Tonopah Midway	1.78
West End Con.	1.30
Jim Butler	1.25
GOLDFI'D STOCKS	
Sandstorm	.70
Kendall	.39
Red Top	4.00
Jumbo	4.00
Goldfield Mining	1.50
Dia'dfield B. B. C.	.38
Atlanta	.70
Mohawk	16.00
Silver Pick	1.25
Laguna	1.75
BULLFROG STOCKS	
Mont. Shoshone C.	10 25
Tramps Con.	1.12
Gold Bar	1 10
Bullfrog Mining	.28
Bullfrog Nat. B.	.41
Homestake Con.	1.20
MANHAT'N STOCKS	
Manhattan Con.	.75
Manhat'n Dexter	.24
Jumping Jack	.17
Stray Dog	.27
Indian Camp	.15

COLO. SPRINGS	Apr. 13
Name of Comp.	Clg.
Acacia	9¼
Black Bell	....
C. C. Con.	5¼
Dante	....
Doctor Jack Pot	7
Elkton	58
El Paso	42½
Findlay	65¼
Gold Dollar	7¾
Gold Sovereign	6¾
Isabella	23⅛
Index	....
Jennie Sample	7¾
Jerry Johnson	....
Mary McKinney	....
Pharmacist	....
Portland	1.16
Un. Gold Mines	8
Vindicator	90
Work	18

New Dividends

Company.	Payable.	Rate.	Amt.
Esperanza, Mex	Apr. 22	$1.32	$300,600
Homestake, S. Dak	Apr. 25	0.50	109,200
Inter. Nickel, pfd	May 1	1.50	131,123
Mary McKinney, Colo	Apr. 25	0.03	39,128
Mines Co. of America	Apr. 26	0.02	40,000
Nipissing, Ont.	Apr. 20	0.15	180,000
N. Y. & Hon. Rosario	Apr. 20	0.10	15,000
Philadelphia Co.	May 1	0.75	434,296
Tenn. Coal, Iron & R.R.	May 1	1.00	225,536
Tenn. C. I. & R.R., pfd.	May 1	2.00	4,960
Tonopah Co., Nev.	Apr. 22	0.35	350,000
United Copper	Apr. 29	1.75½	787,500
United Zinc	Apr. 15	0.50	9,778
U.S. Cast Iron Pipe & Fdy.	June 1	1.00	150,000
U.S. C. I. Pipe & Fdy, pfd.	June 1	1.75	262,500
Vindicator Con. Colo.	Apr. 25	0.03	45,000
Vulcan Detinning, pfd.	Apr. 20	1.25	18,750

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha, Nev.	Apr. 3	Apr. 24	$0.05
Andes, Nev.	Mar. 25	Apr. 30	0.10
Belcher, Nev.	Apr. 16	May 9	0.15
Caledonia, Nev.	Apr. 10	May 1	0.10
California, Cal.	Apr. 3	Apr. 20	0.05
Challar, Nev.	Apr. 22	May 16	0.10
Confidence	Apr. 23	May 14	0.20
Gould & Curry, Nev.	Apr. 10	May 1	0.10
Hale & Norcross, N.	Apr. 3	Apr. 30	0.15
Herkimer Gravel, C.	Mar. 29	Apr. 15	0.04
Mexican, Nev.	Apr. 3	Apr. 25	0.15
Naildriver, Utah	Mar. 30	Apr. 24	0.03
Oro Blanco, Cal.	Feb. 25	Apr. 22	0.03
Sag. Belcher	Apr. 9	Apr. 29	0.05
Union Con., Nev.	Apr. 3	May 8	0.10
Yellow Jacket, Nev.	Apr. 13	May 22	0.10

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108	68.835	30.464	31.852
March	64.597	67.519	29.854	31.325
April	64.765	.....	29.984	.....
May	66.976	.....	30.968	.....
June	65.394	.....	30.185	.....
July	65.105	.....	30.113	.....
August	65.949	.....	30.529	.....
September	67.927	.....	31.483	.....
October	69.523	.....	32.148	.....
November	70.813	.....	32.671	.....
December	69.050	.....	32.003	.....
Year	66.791	.....	30.868	.....

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.356
March	18.361	25.065	18.641	25.560	81.111	106.594
April	18.375	.....	18.688	.....	84.793	.....
May	18.475	.....	18.724	.....	84.867	.....
June	18.442	.....	18.719	.....	83.994	.....
July	18.190	.....	18.585	.....	81.167	.....
August	18.380	.....	18.706	.....	83.864	.....
September	19.033	.....	19.328	.....	87.831	.....
October	21.203	.....	21.722	.....	97.269	.....
November	21.833	.....	22.398	.....	100.270	.....
December	22.885	.....	23.350	.....	105.226	.....
Year	19.278	.....	19.616	.....	87.282	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	.....
February	36.403	42.102	August	40.606	.....
March	36.662	41.313	September	40.516	.....
April	38.900	.....	October	42.852	.....
May	43.313	.....	November	42.906	.....
June	39.260	.....	December	42.750	.....
			Av. year	39.819	.....

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.922	19.703
April	5.404	.....	15.959	.....
May	5.685	.....	16.725	.....
June	5.750	.....	16.813	.....
July	5.750	.....	16.525	.....
August	5.750	.....	17.109	.....
September	5.750	.....	18.266	.....
October	5.750	.....	19.350	.....
November	5.750	.....	19.281	.....
December	5.900	.....	19.609	.....
Year	5.657	.....	17.370	.....

New York, cents per pound. London, pounds sterling per long ton.

AVERAGE PRICE OF SPELTER

Month.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.078	.....	5.931	.....	25.781	.....
May	5.997	.....	5.846	.....	27.000	.....
June	6.096	.....	5.948	.....	27.728	.....
July	6.006	.....	5.856	.....	26.800	.....
August	6.027	.....	5.878	.....	26.938	.....
September	6.216	.....	6.056	.....	27.563	.....
October	6.222	.....	6.070	.....	28.075	.....
November	6.375	.....	6.225	.....	27.781	.....
December	6.593	.....	6.443	.....	27.938	.....
Year	6.198	.....	6.048	.....	27.020	.....

New York and St. Louis, cents per pound. London in pounds sterling per long ton.